"A STUDY OF OCULAR MANIFESTATIONS OF SYSTEMIC LUPUS ERYTHEMATOSUS"

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GOVERNMENT STANLEY MEDICAL COLLEGE & HOSPITAL

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

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CERTIFICATE

This is to certify that the study entitled **"A STUDY OF OCULAR MANIFESTATIONS OF SYSTEMIC LUPUS ERYTHEMATOSUS"** is the result of original work carried out by **DR.S.PRIYADHARSHINI**, under my supervision and guidance at **GOVT. STANLEY MEDICAL COLLEGE, CHENNAI.** The thesis is submitted by the candidate in partial fulfilment of the requirements for the award of M.S Degree in Ophthalmology, course from 2015 to 2018 at Govt. Stanley Medical College, Chennai.

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DECLARATION

I hereby declare that this dissertation entitled "**A STUDY OF OCULAR MANIFESTATIONS OF SYSTEMIC LUPUS ERYTHEMATOSUS**" is a bonafide and genuine research work carried out by me under the guidance of **Prof.Dr.B.RADHAKRISHNAN M.S. D.O.,** Head of the Department, Department of Ophthalmology, Government Stanley Medical college and Hospital, Chennai – 600001.

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INSTITUTIONAL ETHICAL COMMITTEE, STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work	:	A Study of ocular manifestation in systemic lupus erythematosus.
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The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 24.03.2016 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

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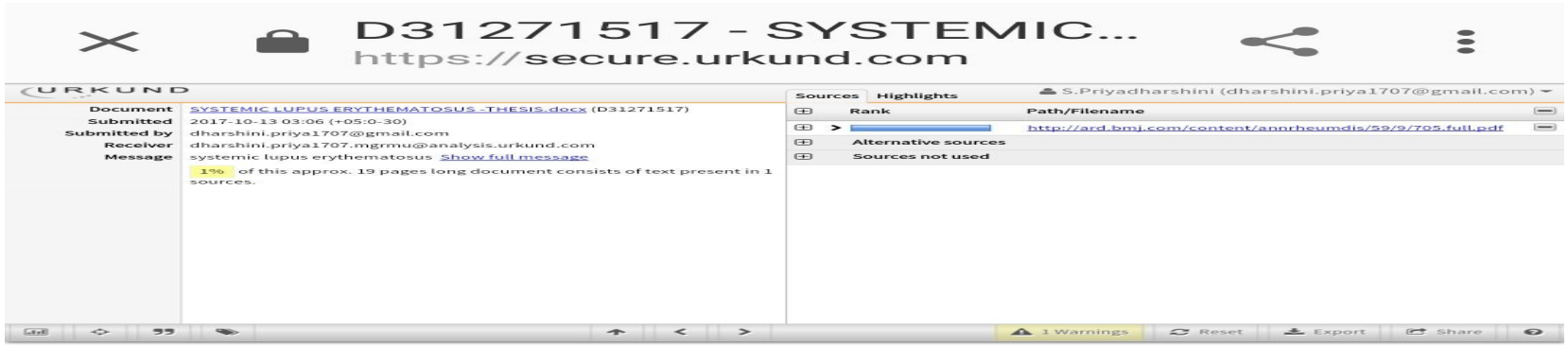

A STUDY OF OCULAR MANIFESTATIONS IN SYSTEMIC LUPUS ERYTHEMATOSUS

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Historical background

Pathophysiology

Ocular and Systemic Manifestations of Systemic Lupus Erythematosus

Investigations

Diagnosis

CERTIFICATE – II

This is to certify that this dissertation work titled entitled dissertation "**A STUDY OF OCULAR MANIFESTATIONS OF SYSTEMIC LUPUS ERYTHEMATOSUS**" of the candidate **Dr.S.PRIYADHARSHINI,** with Registration Number **221513051** for the award of **M.S** degree in the branch of **OPHTHALMOLOGY**. I personally verified the urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows **2%** of plagiarism in this dissertation.

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CONTENTS

INTRODUCTION

Systemic Lupus Erythematosus is disease with various systemic manifestations involving a chronic progressive autoimmune etiology.

The basic pathology in systemic lupus erythematosus is due to the production of a number of pathogenic autoantibodies and immune complexes and to an inability of the immune system to suppress and clear them. This disease present in a variety of forms, degrees, and manifestation, ranging from mild cutaneous and joint involvement to lethal cardiac, renal and cerebral involvement.

The disease presents commonly in young and middle aged woman who comprise upto 90% of the disease sufferers. This disease is three times more common in blacks than in other races. Asians display an increased incidence of the disease than Caucasians.

HISTORY

In 1852 Cazenave and Chausit first used the name lupus erythematos us and described its systemic manifestation

In 1939 Rose and Pillsbury described disseminated multiorgan involvement in this chronic progressive disease of unknown etiology. Their report was considered the beginning of modern history of systemic lupus erythematosus.

In 1941 Klemperer and co-worker published their article on Pathology of Disseminated Lupus erythematosus again emphasizing the importance of vasculitis as a central feature of systemic lupus erythematosus.

In 1964 Halmay and Ludwig described a case of deep band shaped white grayish coloured keratitis with hyaline granular aspect apparently with involvement of descement membrane. This was associated with uveitis in patient with lupus whose cutaneous manifestation were simultaneous with ocular findings.

In 1993 Varga and Wolf described the case of systemic lupus erythematosus with extensive impairment of the CNS and bilateral transient keratoendothelitis responsive to topical and systemic corticosteroids.

PATHOPHYSIOLOGY

Systemic lupus erythematosus is a dysfunction in immunoregulation in an individual triggered by an environment agent such as microbe or a drug or other chemical. The individual must be genetically predisposed to have such dysregulation The immunopathology is related primarily to B lymphocyte hyperactivity and T cell abnormalities as well. Though numerous antibodies and immune complexes are produced all are not pathogenic. The other immunoregulatory mechanisms that are abnormal includes T – lymphocyte numbers and function and the inability to clear antibodies and immune complexes.

Auto antigen – autoantibodies and immune complexes formed in systemic lupus erythematosus patients are deposited at certain loci in “target tissues” and can lead to subsequent complement activation, inflammatory cell chemotaxis to the site of the immune complex. The release of proteolytic and collangenolytic enzymes result in tissue digestion and damage.

A high concordance of disease is seen in genetically predisposed individuals such as monozygotic twins compared to

dizygotic twins and in family members affected with systemic lupus erythematosus. The disease associations are seen with class II HLA genes including HLADR2 and HLADR3 particularly HLA-DRB-I *0301 allele and DQA –I * 0501 allele. These HLA regions exert certain effect on certain autoantibodies. Complement genes C4A, C4B also play important role. Theraputic immune response genes is located region of chromosome 6 according to genetic studies.

Systemic lupus erythematosus vasculitis often shows nonspecific pathological changes. The findings include fibrinoid necrosis of small vessels and capillaries and deposition of immunoglobulin and complement. Clotting within blood vessels may be initiated by lupus anticoagulants. In the eye, the immune complexes deposit in the vascular endothelium of conjunctiva, sclera, choroids, ciliary body and retina, alter the tissue structure and compromise function. The basement membrane of the ciliary body and conjunctiva may also show deposits. Most patients with retinopathy have systemic disease, it can occur independently of systemic flare ups. Morbidity risk is higher in patients with retinopathy .

ENVIRONMENTAL FACTORS

VIRAL INFECTION : Type C virus of reoviridae family can cause an inappropriate immune response to viral infection in Systemic lupus erythematosus. This virus has particular tropism for thymus cells. The virus incorporates its genome into the host genome. The altered DNA provoke antibodies against itself during multiplication. Thus thymic dysfunction and disturbed immunoregulation, molecular mimicry plays important role.

UVRADIATION

DRUG: Hydrazine, Procainamide, Methyldopa, Isoniazid

HORMONAL FACTORS:

More in females and more in pregnant women.

Estrogen enhances the disease and testosterone suppresses it.

SYSTEMIC MANIFESTATION OF SYSTEMIC LUPUS ERYTHEMATOSUS

The various systemic manifestation divided into constitutional, renal, dermatologic, neurological, ophthalmic and others.

CONSTITUTIONAL SYMPTOMS :

Prominent constitutional symptoms include fever, malaise, arthralgia, myalagia, headache, loss of appetite and weight.

Skin findings include the typical malar butterfly rash, discoid lesions, non specific erythematous maculopapular rash, and cutaneous vasculitic lesion.

RENAL MANIFESTIONS :

This is the most common manifestation. All patients of systemic lupus erythematosus have deposits of immunoglobin, in glomeruli, one half of patients have clinical nephritis defined by persistent protenuria. Most patient are asymptomatic except those with edema of nephrotic syndrome. Urine analysis shows haematuria and protenuria. They present with mesangial or mild focal glomerulonephritis. Patients with high proportion of sclerotic glomeruli on biopsy, usually have serum creatinine

of more than 265 micromols per litre are unlikely to respond to immunosuppressive therapy.

DERMATOLOGICAL MANIFESTATIONS:

They play a key role in the diagnostic scoring system and are second most common manifestation. The pathognomonic lupus or butterfly rash across the nose and cheeks occurs in some 30% of patients with systemic lupus erythematosus. Discoid or disc shaped skin lesion may also occur in systemic lupus erythematosus and discoid lupus erythematosus. They begin as erythematosus macules, expand to plaques but always retain their discrete coin shape. They occur on extensor surface of arms and on neck, face and scalp.

They occur in 15 to 30% of patient with systemic lupus erythematosus. Photosensitivity rash is also typical with systemic lupus erythematosus with sunburn of extreme severity. Livedo reticularis is seen in systemic lupus erythematosus patients with frank vasculitis or in those individuals with anticardiolipin antibodies. Alopecia is another manifestation. Other manifestations are raynaud phenomenon, oral nasal or other mucous membrane ulceration and telengiectasias may occur.

NEUROLOGICAL MANIFESTATIONS :

Such manifestations are seen in 25 to 75% of patients and can involve all parts of nervous system. Similar manifestations are seen in connective tissue disorder and a positive correlation is seen with antiphospholipid antibodies and anticardiolipid antibodies. The various manifestations are personality disorder, seizures, psychosis, stroke and migrainous headache.

PREGNANCY AND LUPUS :

High rate of spontaneous abortions and stillbirth are seen in lupus patients who become pregnant. There is also flare up of the disease with resulting fetal loss and fetal growth retardation. Congenital lupus includes discoid lupus and congenital heart block often detected in-utero.

DRUG INDUCED SYSTEMIC LUPUS ERYTHEMATOSUS

The main drugs implicated in systemic lupus erythematosus are procainamide, hydralizne, isoniazid, chlorpromazine, pencillamine, practolol, methyldopa, oral contraceptive pills and propylthiouracil. Drug induced systemic lupus erythematosus patients are mostly woman presenting with polyarthritis, pleuritis or Pericarditis. Anti histone anti bodies are usually present.

SYSTEMIC LUPUS ERYTHEMATOSUS AND OTHER AUTOIMMUNE DISEASES:

The following autoimmune diseases are associated namely autoimmune thyroid disease, hereditary C1Q deficiency, SS-systemic sjogren syndrome.

OCULAR MANIFESTATIONS OF SYSTEMIC LUPUS ERYTHEMATOSUS

EXTERNAL

- KERATOCONJUCTIVITIS SICCA
- CONJUCTIVITIS
- SUPERFICIAL PUNCTATE KERATITIS
- INTERSTITIAL KERATITIS
- EPISCLERITIS AND SCLERITIS

RETINAL MANIFESTATION:

- COTTON WOOL SPOTS
- HAEMORRAGES
- BRANCH RETINAL VEIN OCCLUSION
- CENTRAL RETINAL VEIN OCCLUSION
- CENTRAL RETINAL ARTERY OCCLUSION
- RETINALVASCULITIS
- PROLIFERATIVE RETINOPATHY

CHOROIDAL MANIFESTATION

- ISCHEMIC CHOROIDAPATHY
- RETINAL PIGMENT EPITHELIAL CHANGES
- CHOROIDAL VASCULITIS

NEURO OPHTHALMIC AND ORBITAL MANIFESTATION

- OPTIC NEURITIS
- ISCHAEMIC OPTIC NEUROPATHY
- PSEUDOTUMOUR CEREBRI
- MIGRAINE
- HEMIANOPIA AND AMAUROSIS
- VISUAL HALLUCINATIONS
- GENICULOCALCARINE BLINDNESS
- PUPILLARY AND OCULOMOTOR DISTURBANCE
- INTERNUCLEAR OPHTHALMOPLEGIA
- ORBITAL PSEUDOTUMOUR
- ORBITAL MYOSITIS

Keratoconjuctivitis sicca with or without xerostomia is the most common manifestation of systemic lupus erythematosus that occurs in approximately 25% of patients. Keratoendothelitis causes transient

corneal edema. The lesions responded well to Quinacrine hydrochloride. Diffuse anterior or nodular scleritis closely may mimic the level of systemic activity in the disease. Periorbital edema is a rare manifestation of the disease

LIDS AND CONJUNCTIVA:

Non specific blepharitis without scarring is common. Other lesions are lid plaque, lid scarring, Symblepharon formation. They responded well to topical steroids but recurrence is common in patients with more extensive bilateral involvement. Chemosis may be the initial presentation in systemic lupus erythematosus patients

CORNEAL MANIFESTATIONS :

The corneal manifestations of systemic lupus erythematosus are by large confined to epithelium. Peripheral ulcerative keratitis have been reported in patients with systemic lupus erythematosus. Sicca syndrome is quite common. Gold and his associates found a 6.5% incidence of keratitis in an outpatient population of systemic lupus erythematosus patients. Spaeth studied that 88% of systemic lupus erythematosus patients revealed superficial punctate keratitis with fluorescein corneal staining. Schrimer test were normal in these patients. Therefore the

superficial punctate keratitis seen in these patients are due to dry eye states or due to the disease process itself is under investigation.

SCLERAL INVOLVEMENT:

Recurrent episcleritis, scleritis may be the initial presentation in systemic lupus erythematosus. Scleritis mimics the level of systemic disease and it resolves with adequate control of systemic disease and it will not respond to topical therapy.

UVEAL INVOLVEMENT:

Uveitis is an uncommon manifestation. Patient presents with pain photophobia and diminished vision. On examination there is corneal edema, flare, cells, keratic precipitates and fibrinous membrane. Vision loss is prevented with use of steroids.

RETINAL MANIFESTATIONS:

Retinal involvement in systemic lupus erythematosus is common, next to keratoconjunctivitis sicca. The reported prevalence has varied greatly between patients in precorticosteroid era and ambulatory systemic lupus erythematosus patients with better control of the disease. The appearance and disappearance of retinal lesions in patients with systemic lupus erythematosus parallels the systemic clinical course. If the systemic disease is managed appropriately , parellely there is decrease in retinal

lesions. Patients are usually asymptomatic and rarely complain of loss of vision and scotomas. Moreover systemic lupus erythematosus patients with retinopathy have decreased survival rate compared to systemic lupus erythematosus patients without retinopathy.

RETINAL VESSEL SHEATHING :

Retinal vessel sheathing may be continuous more around the veins than arteries. They are characterized by focal fluffy white cuffing which develop around long stretched vessels.

Pathogenesis:

Circulating leucocytes must slow down and adhere to the vascular endothelium. leucocytes gets adhered to vascular endothelium by adhesion molecules. Initial adhesion by L select in and carbohydrate slows the leucocyte. After adhesion, they stimulate P selectin and E selectin, adhere to the carbohydrate moiety call adhesins in the vascular endothelium. Firm adhesions of the leucocyte by interaction of its integrin receptors latch the cell on the vessel wall flattening of cell occurs following leucocyte activation cell adhesion molecules gets binded on to the endothelium, which in turn initiates migration. These cells migrate out of the endothelium into extracellular matrix and bind to beta-integrins in the extra cellular matrix and form perivascular cuffing.

COTTON WOOL SPOTS:

The hallmark finding in lupus retinopathy is cotton wool spots. They represent areas of microvascular occlusion. They may be isolated or surrounded by haemorrage. They are due to occlusion of precapillary arteriole by thrombus or inflammatory cells, resulting in focal areas of ischemia due to interruption of axoplasmic flow in the nerve fibre layer of retina, resulting in accumulation of axoplasmic material and swelling of nerve fibre layer.FFA correspond to focal areas ischaemic zone. Histology reveals focal swelling of nerve fibre layer with cytoid bodies. The above changes can also be seen in diabetes, hypertension, ischemic retinal vein occlusion.

The histopathological finding in lupus retinopathy includes vessel wall infiltration with fibrillar material leading to vascular constriction and widespread hyaline thrombus formation. Although focal areas of vessel wall infiltrates are seen, the vessel wall themselves are free of inflammatory cells.

This is not a true vasculitis. It might be associated with active systemic disease and CNS lupus

VASODISRUPTION

Intraretinal haemorrhages are frequent finding in lupus retinopathy. Microaneurysm formation, vascular leakage, retinal edema, preretinal haemorrhage can occur. Studies have proven that increased intraretinal haemorrage is proportional to increased risk of mortality

ARTERIAL OCCLUSION

Lupus retinopathy doesn't usually present with arteriolar occlusion. This is associated with active systemic disease and CNS lupus central retinal artery occlusion, extensive capillary non perfusion and retinal neovascularisation may occur. More common in patients with antiphospholipid antibodies. Acquired proteins deficiency is also reported in systemic lupus erythematosus.

VENOUS OCCLUSION:

Systemic lupus erythematosus does not affect veins. Veins are indirectly affected due to Arterial occlusion, which in turn leads to venous stasis and engorgement of veins with a picture resembling central retinal vein occlusion

ISCHEMIC SEQULAE:

Sometimes systemic lupus erythematosus patients may present with bilateral mottled retinas with spots or clumps of pigments. DD: retinitis pigmentosa. These may be dueto vaso occlusive phenomenon. Features of hypertensive retinopathy like arteriolar attenuation, arterio venous crossing changes, hard exudates, intra retinal haemorrage can occur.

The data has indicated that if retinal vasculitis exists in a patient with systemic lupus erythematosus, then the renal, pulmonary and cardiovascular status of the patient will be the next to suffer the consequences of immune complex vasculits is as illustrated by el-Asrar and Associates.

CHORDOIAL INVOLVEMENT

Choroidopathy is rare in systemic lupus erythematosus as compared with retinopathy to immune complex deposits in bruch membrane. Transudation of fluid is seen through bruch's membrane and the retinal pigment epithelium which appears to be affected by ischemia. The presence of antineuronal antibodies found in serum and CSF of systemic lupus erythematosus patients has led them to speculate the existence of anti retinal pigment epithelial antibodies. Sometimes

choroidal infarction with occlusive vascular disease leads to irreversible blindness - “ELSCHNIG SPOTS.” I have shown extensive deposits of immune complexes in the choroid immunopathological studies probably because of high vascularity. Others include extensive mononuclear cell inflammatory infiltrate. Although drastic changes are seen in lupus in choroids than retina they are always subclinical. A case of bilateral serous detachment has been reported in systemic lupus erythematosus.

NEURO OPHTHALMIC INVOLVEMENT

The neuro ophthalmological manifestations have been reviewed by LESSEL.[23] Anterior or posterior ischemic optic neuropathy or a picture similar to optic neuritis has been reported. The optic nerve and chiasma may be involved in systemic lupus erythematosus most likely by an ischemic process. Pathological findings include optic nerve demyelination, axonal necrosis or a combination of both. These findings are associated with antiphospholipid antibodies. Retrochiasmal visual problems in lupus include geniculocalcarine blindness, homonymous hemianopia, visual hallucinations and transient amaurosis.

Disc edema in lupus may be secondary to hypertension, central retinal vein occlusion, focal ischemic disease, increased intra cranial

tension, or transverse myelitis. A clinical picture similar to pseudotumour cerebri has also been reported.

Patients with systemic lupus erythematosus are prone to migraine and amaurosis in systemic lupus erythematosus and respond better to nifidipine suggesting a vascular etiology. Manifestation consistent with Miller Fisher Syndrome in systemic lupus erythematosus (ataxia, areflexia, ophthalmoplegia) has also been reported. Isolated ptosis and isolated sixth nerve palsies are also reported.

Lupus erythematosus does not directly affect pupil. The pupillary abnormalities in systemic lupus erythematosus are secondary to brain stem lesions. Painful ophthalmologist occurs in lupus erythematosus which can be reversed by steroids vestibulobasilar insufficiency may present with Diplopia which is transient phenomenon often associated with vertigo. Unilateral inter nuclear ophthalmoplegia is well documented with systemic lupus erythematosus.

OTHER OPHTHALMIC INVOLVEMENT:

Orbital involvement mimics pseudotumour cerebri and there is a good response to steroids. Reports of concomitant development of Brown syndrome have also been noted. Often this is the cause of vertical diplopiain patients with Orbital myositis manifesting with proptosis, pain with external ocular movements restriction have been systemic lupus erythematosus.

SYSTEMIC INVESTIGATIONS

ROUTINE BLOOD INVESTIGATIONS

- Total count
- Red blood cell count
- Differential count
- Erythrocyte Sedimentation Rate
- FSerum Creatinine
- Blood urea
- Bleeding Time
- Clotting Time
- Prothrombin Time
- Findings may include anaemia, leucopenia, lymphopenia, thrombocytopenia and Erythrocyte sedimentation rate will be raised.

URINE ALUBUMIN, SUGAR , DEPOSITS:

Since renal pathology is more common in systemic lupus erythematosus. Albuminuria is ruled out in these patients.

***IMMUNOLOGICAL TESTS*;**

Antinuclear antibodies are elevated in 95% of patients with systemic lupus erythematosus. However their absence does not rule out the diagnosis.

Anti Nuclear Antibodies can be seen in other systemic diseases. But specific antibodies for systemic lupus erythematosus are antibodies to double stranded and anti smith antibodies to polypeptides that complex with certain species of nuclear RNA. Disease activity in systemic lupus erythematosus is directly proportional to high titres of Anti Nuclear Antibodies and low complement levels and with high titers of cryoglobulins by the Red cell assay. Some of the antibodies found in systemic lupus erythematosus are as follows.

Specificity antigen	*clinical importance and comments*
Nuclear	multiple antigens detected: sensitive when Hep-2 or WIL-2 cells used; used quite non specific.
NativeDNA	highly specific for systemic lupus erythematosus seen in 70% of lupus patients, associated with nephritis and disease activity
Denatured DNA	high titers in systemic lupus erythematosus; low titers in other diseases
Sm (smith)	highly specific for systemic lupus erythematosus seen in 50% of patients
Histones	more common in drug induced systemic lupus erythematosus (95%)
Nuclear	seen in systemic lupus erythematosus highest
Ribonucleoprotein	titers in multiple connective tissue disease
Ro(SSa)	seen in primary sjogren syndrome and systemic lupus erythematosus
La(SSb)	seen in primary sjogren syndrome and systemic lupus erythematosus
Nucleolar	seen in scleroderma, primary sjogren and systemic lupus erythematosus

Phospholipid cardiolpin	seen in systemic lupus erythematosus and other diseases ;gives false positive VDRL
Clotting factors	lupus anticoagulants, cause prolonged PTT associated with venous and arterial thrombosis
Endothelial surface Antigens	may contribute to thrombosis
Platelet surface antigen	associated with thrombocytopenia
Erythrocyte surface Antigens	occasionally associated with haemolysis
Lymphocyte surface antigens	may be associated with leucopenia and abnormal T cell function
Neuronal antigens	high titers are correlated with diffuse CNS Lupus

ELISA

Recent study using enzyme linked immunosorbent assay has shown that the level of plasma cell free Fc gamma receptor III (Fcgamma RIII) also may increase significantly in patients with systemic lupus erythematosus. Also using ELISA, antibodies to human fibronectin (anti-

fn) are detected in the sera of 34% of patients with systemic lupus erythematosus. There is an association with serum anti fibronectin antibodies and disease activity in systemic lupus erythematosus.

INTERLEUKINS

Patients with systemic lupus erythematosus have elevated levels of Soluble interleukin (IL-2)receptor (CD25) and soluble CD27 and CD 30 molecules, prior to an exacerbation of clinically evident disease activity. In addition, there can be increased serum levels of interleukin-6 (IL-6) and interferon gamma in patients with systemic lupus erythematosus.

Abnormalities have also been detected in patients with systemic lupus erythematosus. There is local synthesis of oligoclonal IgG in 25% of cases and worsening of blood barrier function.

OCULAR INVESTIGATIONS

Clinical tests for dry eye

There is no single “gold standard” test for detecting dry eye disorders.

Schirmer I test is done without anaesthesia using Whatman filter paper ≠41.Room temperature and humidity must be consistent from test to test. The time of administration of the last drop and the time of testing are recorded. The testis done under ambient light conditions. Only one pair of tests should be done on a given day.

The test is done without touching the paper directly with the finger toavoid contamination of skin oil. The paper is placed at the junction of the middle and lateral one third of the lower eye lid. The patient is told to look forward and blink normally while a strip is placed in the right eye followed by the left eye. The strips are removed after 5 min and the amount of wetting is recorded in millimeters. The amount of wetting less than 10mm is considered to be positive.

Basal Schirmer test is done after anaesthetising with a drop of proparacaine. Schirmer strips are placed and the wetting is recorded. Amount of wetting less than 5mm is considered to be positive.

Augumented Schirmer test: Schirmer strips are placed and the nasal mucosa is irritated near the middle meatus with swab sticks. Reflex tearing is present in non-Sjogren's syndrome and absent in Sjogren syndrome.

Tear break up time

Break up time may measured invasively by using fluorescein (FBUT) or non-invasively using a keratometer or a xeroscope (NBUT). Fluorescein breakup time may not be reproducible and may not reliably reflect disease. Fluoresce in strips are wet with a standardised drop of non-preserved saline solution and the strip is touched to the interior palpebral conjunctiva. Subjects are asked to blink several times and asked to move their eyes around thoroughly mix the fluorescein with the tear film. Patients are asked to first close and then open their eyes. The time from opening of the eyes to the appearance of the first dry spot is measured three times and the mean is recorded. A 10 second reference value is taken and <10 seconds is taken as abnormal.

Non invasive breakup time requires a keratometer or a xeroscope. Break up times are shorter using a keratometer as compared to xeroscope.

Rose Bengal staining

Rose Bengal stains areas of ocular surface where the tear film is discontinuous. It is commercially available as impregnated strips. Classically, the Van Bijsterveld grading system has been used assigning a grade (0-3) based on density of staining of the temporal and nasal conjunctiva and cornea of each eye.

Examination by light passed through green filter is recommended after Rose Bengal staining.

Tear film osmolarity

This test has high sensitivity and specificity when used as a single test and hence is taken as a “gold standard”. However, it is unable to distinguish evaporative and tear deficient dry eye. The technique requires determining osmolarity on basal tears and the avoidance of reflex tearing. Commercially osmometers are available. But the process still needs standardization and an experienced technician.

Other tests are:

Fluorescein clearance test

Lissamine Green staining

Tear ferning

Conjunctival impression cytology

Brush cytology

Lysozyme assay

Lactoferrin assay

Tear protein analysis

Appendix B: Dry Eye Severity Grading Scheme according to DEWS 2007

Dry Eye Severity Level	Level 1	Level 2	Level 3	Level 4#
Discomfort, severity & frequency	Mild and/or episodic; occurs under environmental stress	Moderate episodic or chronic, stress or no stress	Severe frequent or constant without stress	Severe and/or disabling and constant
Visual symptoms	None or episodic mild fatigue	Annoying and/or activity limiting, episodic	Annoying, chronic and/or constant, limiting activity	Constant and/or possibly disabling
Conjunctival congestion	None to mild	None to mild	+ / -	+/++
Conjunctival staining	None to mild	Variable	Moderate to marked	Marked
Corneal staining (severity/ location)	None to mild	Variable	Marked central	Severe punctate erosions
Corneal/tear signs	None to mild	Mild debris, reduced meniscus height	Filamentary keratitis, mucus clumping, increased tear debris	Filamentary keratitis, mucus clumping, increased tear debris, ulceration
Lid/meibomian glands	MGD variably present	MGD variably present	Frequent	Trichiasis, keratinization, symblepharon
TFBUT (sec)	Variable	≤10	≤5	immediate
Schirmer score (mm/5min)	Variable	≤10	≤5	≤2

TFBUT = Fluorescein Tear break-up time; MGD = Meibomian gland disease
# Must have Signs AND Symptoms
Reproduced with permission from Lemp MA (Chair). Definition and classification Subcommittee of the International Dry Eye Workshop. The definition and classification of dry eye disease: report of the Definition and classification Subcommittee of the International Dry Eye Workshop (2007). *Ocul Surf* 2007;5:88.

Slit Lamp examination

Indirect ophthalmoscope

Anterior chamber tap

Vitreous tap

Fundus fluorescein angiography

Aim: To evaluate retinal perfusion

To detect retinal neovascularsation

Confirm lupus choroidopathy

Findings:

- Areas of poor capillary bed perfusion usually around disc and macula21
- Abrupt termination of retinal arteries and arterioles
- Focal areas of capillary drop outs – cotton wool spot, irregular retinal vessel caliber
- Marked stasis with segmentation of blood column and dye extravasations in veins
- Neo vascular tufts seen as points of dye leakage

DIAGNOSIS

The diagnosis of systemic lupus erythematosus is based on a combination of clinical and laboratory criteria, which have varied over the past decade. Two of the most useful systems are those proposed by Cohen and associates (and accepted by the American Rheumatism Association) and by Hahn.

American rheumatism Association criteria

The revised 11 diagnostic criteria proposed by the American Rheumatism Association (ARA) are accepted widely. The diagnosis of SLE can be made if four of these criteria are met, serially or simultaneously, during any interval of observation. Ocular disorder is not one of the criteria.20,26

Criteria for classification of SLE

Criterion	Sensitivity (%)	Specificity (%)
Malar rash: flat or raised erythematosus rash over malar eminences	57	96
Discoid rash: raised, erythematosus	18	99

Criterion	Sensitivity (%)	Specificity (%)
patches with adherent keratoic scaling and follicular plugging		
Photosensitivity: skin rash by history or physician observation caused by unusual reaction to sunlight	43	96
Oral or nasopharyngeal ulcers: usually painless	27	96
Nonerosive arthritis: involving two or more peripheral joints	86	37
Serositis: pleuritis (by history or if rub or effusion are present) or pericarditis (electrocardiographic changes, rub, or pericardial effusion)	56	96
Renal disorder: persistent proteinuria or cellular casts	51	94
Neurological disorder: seizures or psychosis in the absence of metabolic disease or offending drug	20	98

Criterion	Sensitivity (%)	Specificity (%)
Hematological disorder:anemia, leucopenia, lymphopenia, or thrombocytopenia	59	89
Immunological disorder: positive lupus erythematosus cell preparation, anti-DNA antibodies, anti-Sm antibodies, or false-positive serology for syphilis	85	93
Antinuclear antibody: abnormal titer in the absence of known offending drugs	99	49

Hahn's criteria anti Nuclear Anti Bodies (1:5) + score of 7 points

	POINTS
Butterfly rash	2
Rash biopsy findings compatible with SLE	2
Polyarthritis	2
Serositis	2
Glomerulonephritis biopsy findings compatible with SLE	2
LE cells	2
Rash compatible with SLE, not biopsy-proved	1
Clinical nephritis, no biopsy	1
Organic brain syndrome	1

	POINTS
Localizing neurologic signs	1
Alopecia	1
Raynaud’s phenomenon	1
Nail-bed capillary abnormality	1
Arthralgia	1
Fever	1
Retinal cytoid bodies	1
Polymyositis	1
Myocarditis	1
Hemolytic anemia	1
Leucopenia	1
Thrombocytopenia	1
Lymphadenopathy	1
Positive results on direct Coombs’ test	1
False-positive STS results	1
Antibodies to DNA	1
Hypergammaglobulinemia	1
Hypocomplementuria	1
Circulating anticoagulant	1

TREATMENT

Successful treatment for ocular manifestations of SLE is in correcting the underlying cause and reating loal manifestations like Keratitis and Tear deficiency. Sicca syndrome is usually treated using tear replacement, soft contact lenses, punctal occlusion which produces both symptomatic and objective improvement. Topical steroid therapy is a useful adjuvant treatment for scleritis along with the systemic steroid therapy. Only with successful control of the underlying systemic disease the retinopathy resolves.

The mainstay of treatment is successful Immunosupression primarily with corticosteroids and other Immunosuppressive drugs like cyclosporine A 2.5 mg to 5mg/kg/BW 2 times daily also given in addition. Other immunosuppressants used are tacrolimus, methotrexate, azathioprine and cyclophosphamide.In addition to that recently mycophenolate mofetil, which inhibits purine synthesis, has been tried.

Laser photocoagulation is believed to beneficial for proliferative retinopathy, using criteria from studies on diabetes and branch retinal vein occlusions. Recently a case of anterior segment ischemia is a

reported after Panretinal photocoagulation for proliferative lupus retinopathy.

Although the mechanism of ischemia was not clear, To prevent this complication the authors suggested avoiding undue pressure with the contact lens during photocoagulation, maintaining the treatment sessions short, and avoiding Retrobulbar anesthesia. Flat retinal new vessels formation are treated by argon laser spots 200-500μm for 0.1 sec. Panretinal photocoagulation 500μm for 0.1 sec 1500-2000 burns in 2to 3 settings. But if there is vitreous hemorrhage and tractional retinal detachment surgical intervention may be necessary.

Systemic treatment

Many patients with systemic lupus erythematosus have milder form of disease, and they usually lead normal life with conservative therapy by having adequate rest and nutrition, use of askin-protective sunscreen. If avoiding sun exposure is impossible use of salicylatesn be considered and other NSAIDS for control of arthralgia, myalgia, lowgrade serositis, and mild constitutional symptoms. In Arthralgia and for arthritis control and for therapy for cutaneous lesions or mild anterior segment ocular inflammatory lesions with Antimalarial therapy (e.g., hydroxychloroquine sulfate) if the NSAIDS have not been effective. One

has to watch for the possibility of development of a drug-induced retinopathy carefully. Patients can test themselves with an Amsler's grid. Patient with severe manifestations of systemic lupus erythematosus require treatment with systemic corticosteroids Minimum daily dose of corticosteroid required for adequate control of disease activity should be given for those patient who are having disabling constitutional symptoms and articular, cutaneous, and other systemic manifestations of the disease which are unresponsive to the before mentioned conservative therapy Alternate-day steroid therapy is ineffective in the treatment of systemic lupus erythematosus, and most patients respond better to daily divided doses (e.g., two or three times a day) when compared to single morning doses of corticosteroid. Severe form of systemic lupus erythematosus affecting the central nervous, cardiovascular, pulmonary, or renal system may require initial high-dose (60-300 mg of prednisone/day) steroid therapy, which are tapered as soon as clinical improvement warrants it. While tapering prednisone daily dosage from the 60mg/day level, a useful rule of thumb is practiced to decrease the dosage by 10 percent every 3 days until 40mg/day is reached; then the tapering should be slower. High-dose intravenous steroid therapy (1-2 gm of methylprednisolone/day for 3- 6 days) in conjunction with high-dose oral steroid (100-300 mg of prednisone/day) is given for patients with severe Renal and CNS

involvement. Combination therapy of corticosteroid-cytotoxic may be helpful in severe systemic lupus erythematosus and in cases in which the systemic corticosteroids cannot be tapered below toxic levels without exacerbations of clinical disease. The most effective cytotoxic agent like Cyclophosphamide and procedure like Plasmapheresis for lupus crisis is also thoroughly investigated for this purpose. In certain forms of systemic lupus erythematosus Dapsone has yielded good therapeutic results.

REVIEW OF LITERATURE

1. Ophthalmic manifestations in Asian patients with systemic lupus erythematosus Yap EY, Au Eong KG, Fong KY, Howe HS, Boey ML. Cheah WM Feng PH.

   Singapore Med Journal, 1998 Dec; 39(12) : 557-9.

A study using 70 Asian patients was conducted with systemic lupus erythematosus from tertiary rheumatology unit to ophthalmology Department. This 70 patients includes 66 females (94%) and 4 males (6%) the mean age of patients was 32.9 yrs (9-67). Ophthalmic symptoms were present on 5 patients (7%) while 65(93%) were asymptomatic. Schrimers test were positive in Eighty-three eyes of 45 patients. 27 of these eyes of 17 patients also had concomitant rose Bengal staining of the cornea and the conjunctiva.Retinal vascular lesions were present in Seventeen eyes of 9 patients. Fourteen of these eyes had mild microangiopathic retinopathy with BCVA of 6/12 or better and 3 had retinal vaso occlusive disease with BCVA worse than 6/12. 2 eyes of 14 patients had cataract and 3 eyes of 2 patients had raised intraocular pressure. 12 eyes of 7 patients had BCVA worse than 6/12 because of optic neuropathy (4 eyes), Posterior subcapsular cataract were present in

4 eyes and Retinal vaso occlusive disease were present in 3 eyes and phthisis bulibi in 1eye. None had any eyelid lesion, extraocular motility disorder or retrochiasmal disorder of vision.

2. Retinal Disease in patients with systemic lupus erythematosus Osmau Ushiyama, Keiko Ushiyama Syuichi Koarada, Yoshifumi Tada Noriaki Suzuki Akihide Ohta, Shinji Oono Kohei Nagasawa.

Ann. Rheumatology Dis 2000; 59: 705-708.

A cross sectional study was made in 69 patients with systemic lupus erythematosus. The incidence retinopathy was young in 7 out of 69 patients (ie) 10% of patients. The patients with retinopathy had higher levels of serum Creatinine than the patients without retinopathy ($p<0.01$). The finding included vasculitis, cotton wool spots, hard exudates all which was considered to reflect vascular damage

3. Ocular manifestation of systemic lupus erythematosus in children.

A1 – Mayouf SM, Al – Hemidan AI.

Saudi Med J.2003 Sep; 24(9): (964-6).

52 consecutive children (45 females & 7 males) with systemic lupus erythematosus completed evaluation. The mean ages of patients

were 11.3 years. In those 52 pateints 18 patients (34.6%) had ocular manifestation, 7 patients had abnormal schrimers test (2 bilateral, 5 unilateral), 5patients (4 unilateral, one bilateral) had retinal vascular lesions. One patient had bilateral iridocyclitis.Three patients had unilateral optic neuropathy and eleven patients had visual field defects (4 bilateral, 7 unilateral).

4. Neuro Ophthamological manifestations of systemic lupus erythematosus in Asian patients.

   Teoh SC, Yap EY, Au Eong KG.

   Clinic experiment ophthalmology 2001Aug: 29(4) 213-6.

   To report 8 patients diagnosed as systemic lupus erythematosus who presented with a variety of neuro ophthamological complications. Optic neuropathy and eye movement abnormalities are the most common manifestations seen. One has to consider systemic lupus erythematosus in young woman who present with a recent onset of neuro ophthalmologic symptoms and signs.

5. Unusual eye manifestations in systemic lupus erythematosus patients.

Drosos AA, Petris CA, Petroutsos GM, Moutsopoulos HM.

Clinic Rheumatology 1989 Mar; 8(1): 49-53.

112 of patients were reviewed out of which 4 patients presented with unusual ocular manifestation We found that anterior uveitis is not an uncommon manifestation of systemic lupus erythematosus and physician must be aware of it during patient evaluation since it can be treated without serious visual loss. Optic neuritis is uncommon in systemic lupus erythematosus and visual loss may be permanent despite therapy.

6. Systemic lupus erythematosus and the eye.

Quan Dong Nguyen, C. Stephen Foster.

IOC – Volu 38(1) 1998; Pg 33-36.

Systemic lupus erythematosus is usually diagnosed if 4 of the 11 criteria by American Rheumatism Association are met, serially or simultaneously during any interval of observation. Ocular disorder is not one of the criteria.Usual age of onset of disease is 15 and 45 which is mostly seen in women (90%). The most common ocular manifestation of systemic lupus erythematosus are Keratoconjuctivitis sicca with or without xerostomia, Occurs in 25% patients. Retinal involvement in

systemic lupus erythematosus is quite common second only to Keratoconjuctivitis sicca.

7. Prominent ocular findings as an early manifestation and of systemic lupus erythematosus.

Ashish. M.Mehta MD., Thomas E Frane M.D.

JPOS volume 35(2) 1998 Mar to Apr 114-115.

Unusual for ocular manifestation to precede with initial presentation of systemic disease. Gold and his colleagues showed 6.6% incidence of superficial keratitis and 1.6% uveitis (location unspecified).

8. Corneal staining in systemic lupus erythematosus Spaeth GL:

N Eng J. Med 276 1186/1987

In a study conducted by Spaeth at National Institute of ophthalmology in which he states systemic lupus erythematosus patients hospitalized 88% had superficial punctate keratitis with fluorescein corneal stain. He also reports that schrimer test were normal in some of these patients and therefore the issue of whether the superficial punctate keratitis seen in systemic lupus erythematosus is always truly the result of

sicca syndrome or in fact due to corneal epithelial damage is unclear. Patient also exhibits punctate keratitis unrelated to dry eye status.

9. External ocular finding in lupus erythematosus: a clinical and immune pathological study.

Peggy Frith, S M Burge, P R Millard, F Wonjnarowska

British Journal Ophthalmology 1990, 74, 163-167.

In a selected group of 18 patients with systemic lupus erythematosus examination for dryness of eyes was performed. It was found in 2 of 11 patients. The five patients had recurrent episcleritis. More than half of the patients had ocular manifestation. Usually ocular features occurs early which may be sufficiently characteristic to suggest the diagnosis of lupus erythematosus.

10. Retinopathy in systemic lupus erythematosus.

James Coppeto, Simmons Lessell.

Arch Ophthalmol- vol 95, May 1977. (797-799)

A 32 years old black women patient with systemic lupus erythematosus went rapidly blind due to severe bilateral Retinal

vasculitis. This may be due to total arrest of retinal circulation by thrombosis of most retinal vessels including major arteries.

11. Optic Neuropathy in Systemic Lupus Erythematosus

Douglas A. Jabs, Neil R. Miller, Steven A. Newman.

Arch Ophthalmol 1986; 104: (564-568).

Visual outcome varied in a reported 7 cases of optic neuropathy in systemic lupus erythematosus, but improvement occasionally occurred following treatment with corticosteroids. The clinical picture was variable and could present as acute retrobulbar optic neuritis, ischemic optic neuropathy, or slowlyprogressive visual loss. All the above mentioned manifestations were due to vasco-occlusive disease in small vessels of the optic nerves.

AIM OF THE STUDY

To determine the spectrum and prevalence of ocular manifestation of Systemic Lupus Erythematosus.

To identify potentially sight threatening lesions in ocular Systemic Lupus Erythematosus.

MATERIALS AND METHODS

A prospective observational study was carried out in GOVT. STANLEY HOSPITAL, Chennai. 86 patients with Systemic Lupus Erythematosus were included in the study and ophthalmic examinations were carried out.

INCLUSION CRITERIA:

All systemic lupus erythematosus patients attending Stanley Outpatient department were included in this study

EXCLUSION CRITERIA:

Patients with diabetic and hypertensive retinopathy were not included in this study.

In all these patients, demographic data like name, age, sex and place of residence were recorded. A detailed history regarding systemic symptoms, ocular complaints, treatment history and relevant family history noted. laboratory investigation reports including blood sugar, blood urea, serum creatinine, protenuria, total count, erythrocyte segmentation rate, bleeding time, clotting time, electrocardiogram, red blood cell count, differential count, Hemoglobin and Anti double

stranded DNA results were recorded. Ocular examination using bright torch light using focal illumination, Binocular loupe and slit lamp examination was carried out for all cases.

The eyebrows, eyelids, conjunctiva, cornea, sclera, lacrimal system were closely studied. For all cases Tear film level, tear break up time, schrimer strip application, stained corneal examination was carried out and Tear film level of less than 0.3mm, tear break up time of less than 10seconds and schrimer strip less than 10mm were considered to be abnormal and degree of dry eye status was noted. Cornea was checked for any superficial punctate keratitis, corneal opacities and interstitial keratitis. Corneal sensation was also noted .Iris for any signs of iritis, iris atrophy and lens for any cataractous changes were noted down.

Visual acuity by snellens chart, intraocular pressure measurement using applanation tonometer, fields by Bjerrum screen, recording was also done for all patients. Refraction and appropriate glass correction given. A detailed Fundus examination using a direct ophthalmoscope and indirect ophthalmoscope was done to rule out retinal central and peripheral lesions and all findings recorded by fundus photography.

Retinopathy was defined as the presence of any of the following lesions; haemorrhages, vasculitis (Sheathing of retinal arterioles and /or

venules or vascular tortuosity),hard exudates, cotton wool spots, papilloedema, or retinal detachment . Hard exudates in patients with essential hypertension or diabetes mellitus, were considered to be the result of deposition of exudated lipids or proteins form the degenerated ocular nerves or from vessels with hyperpermeability so retinal lesions caused by hypertension, arteriosclerosis, or diabetes mellitus, were excluded from the study.

Renal disease was defined according to 1982 ACR criteria with persistent proteinuria (>0.5g/day or >3+) or cellular casts, or both and raised serum creatinine level (normal >84μmol/l) was also included in the index. All the data were analysed statistically by proportion test and Wilcoxon signed Rank Test.

OBSERVATIONS AND RESULTS

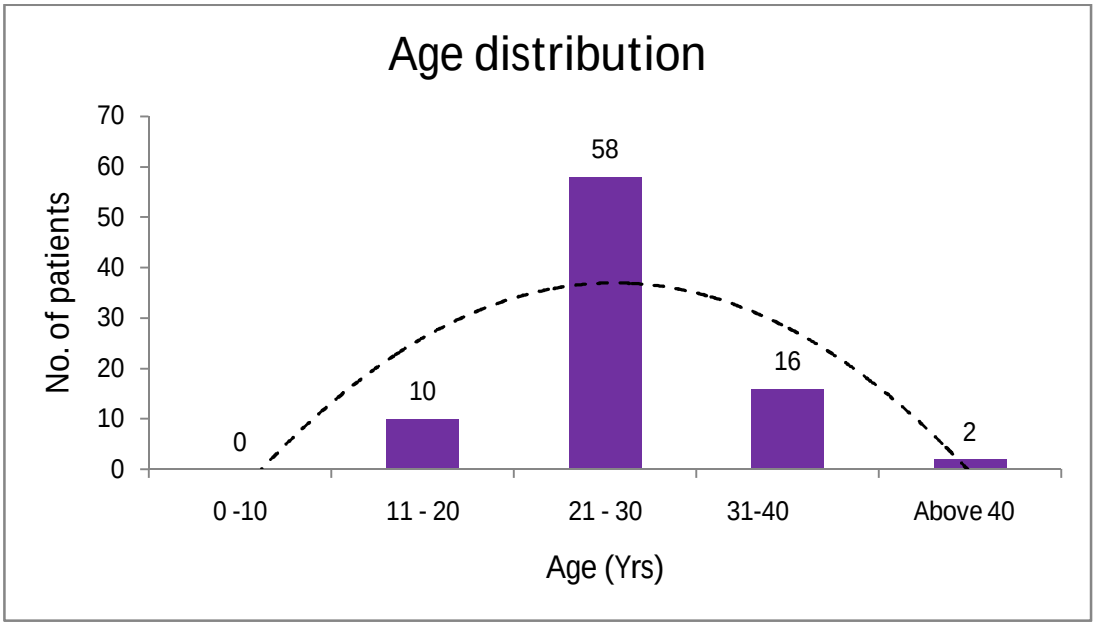
Total No: of Patients – 86

During this period of study from 2016 - 2017, the total No of systemic lupus erythematosus patients reported to Ophthalmology Outpatient department was 86.

Age Distribution

Table 1

Age Distribution	Number	%	Mean	SD
0-20 years	10	11.63	27.07	6.55
21-30 years	58	67.44		
31-40 years	16	18.60		
41-50 years	0	0.00		
51-60 years	2	2.33		
Total	86	100.00		



Out of 86 patients examined 10(11.6%) patients were in the age group of 1-20 years and 58(67.4%) patients were in the age group of 21-30 years and 16(18.6%) patients were in the age group 30-40 years. Two cases above forty years of age was reported in this study.

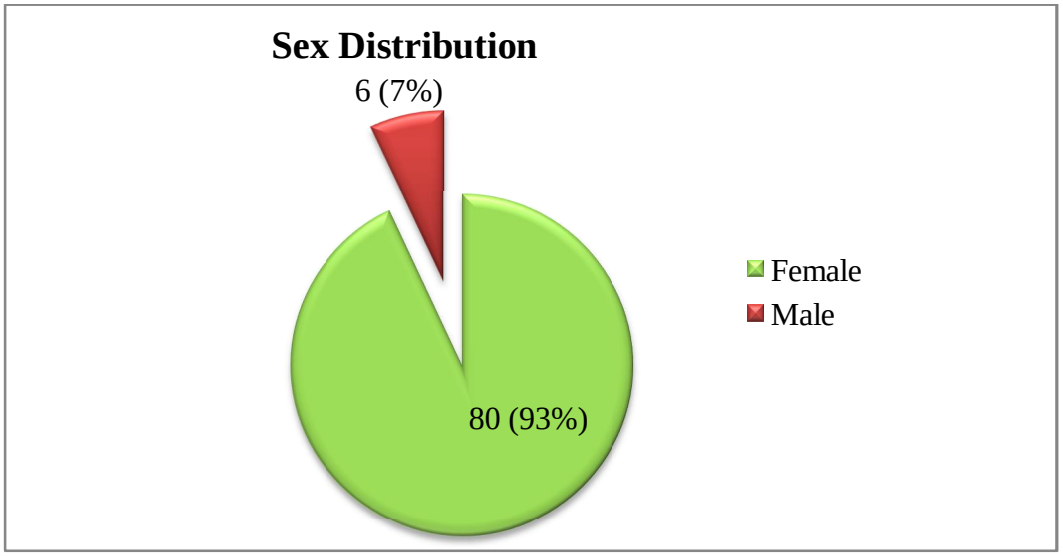
The youngest female reported was 14 years of age.

Mean age was 27.07 yrs

2. Sex distribution:

Table 2

Sex distribution		
Sex	**No.of patients**	**%**
Female	80	93.0
Male	6	7.0
Total	86	

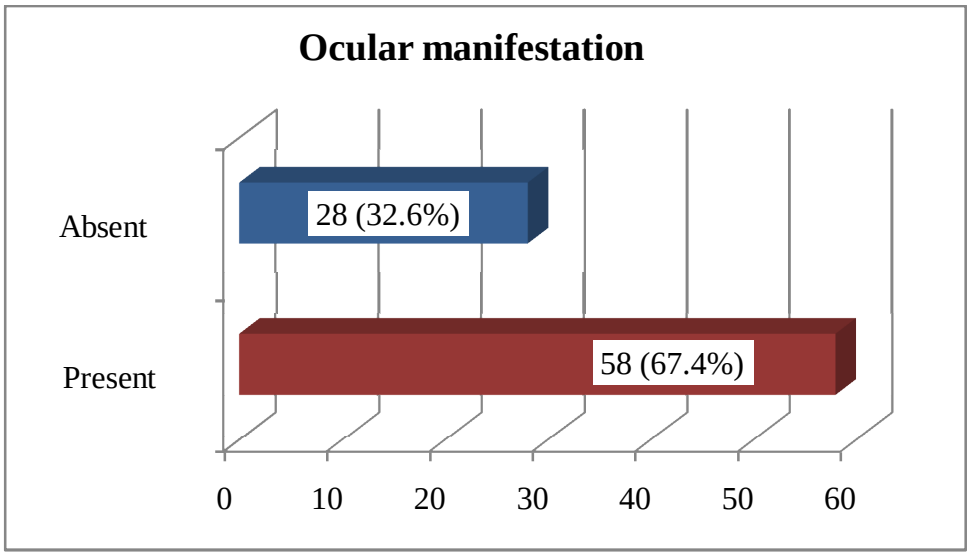


In this study 80(93.0%) patients were females and 6(7.0%) patients were males.

3. Ocular Manifestation in Systemic lupus erythematosus

Table 3

Ocular manifestation	No. of patients	%
Present	58	67.4
Absent	28	32.6
Total	86	



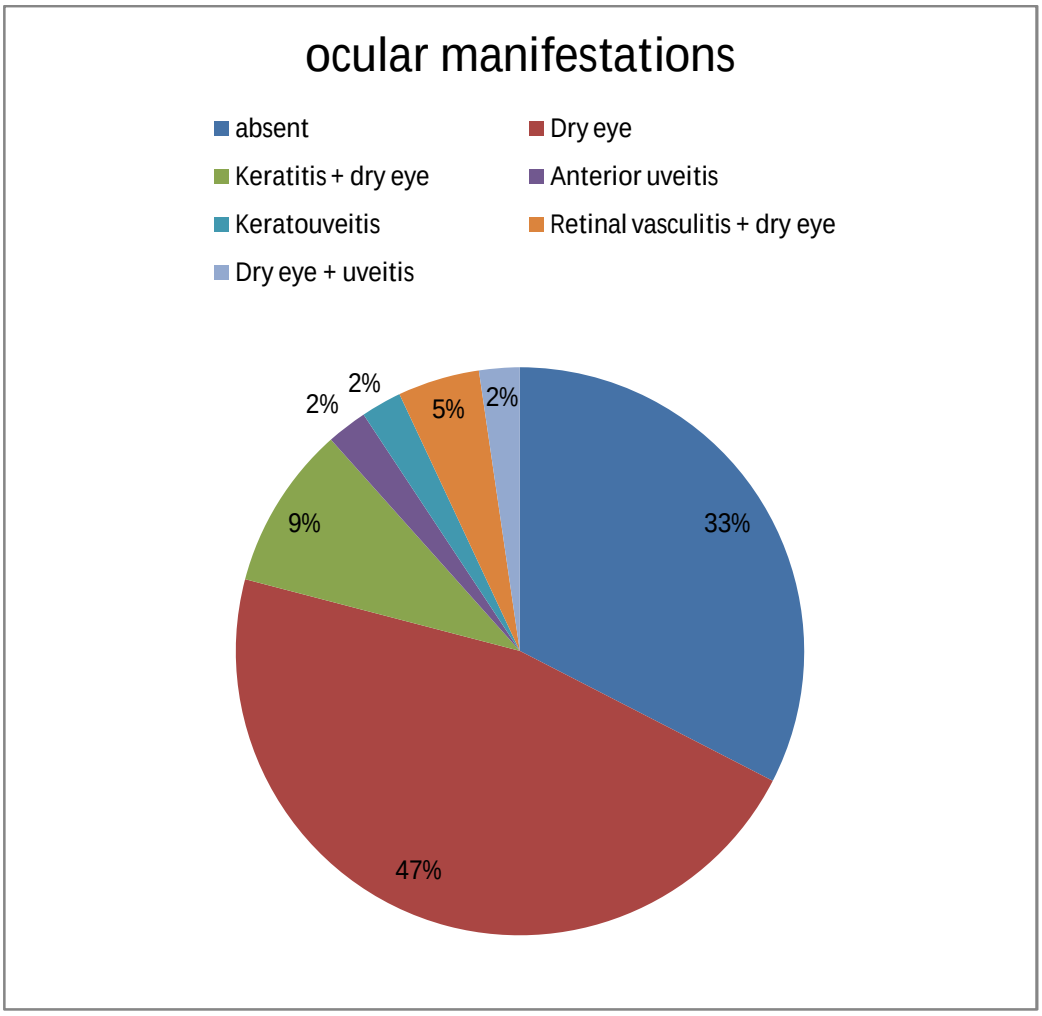
Out of 86 patients in study group, 58(67.4%) patients had ocular manifestation, where as 28(32.6%) patients had no ocular manifestations.

Out of the 58 patients with ocular manifestations, the following findngs were observed

Table 4

Ocular manifestations	No. Of patients	Percentage
Dry eye	40	46.11%
dry eye + Keratitis	8	9.3%
Dry eye + uveitis	2	2.32%
dry eye + Retinal vasculitis	4	4.65%
Anterior uveitis	2	2.32%
Keratouveitis	2	2.32%

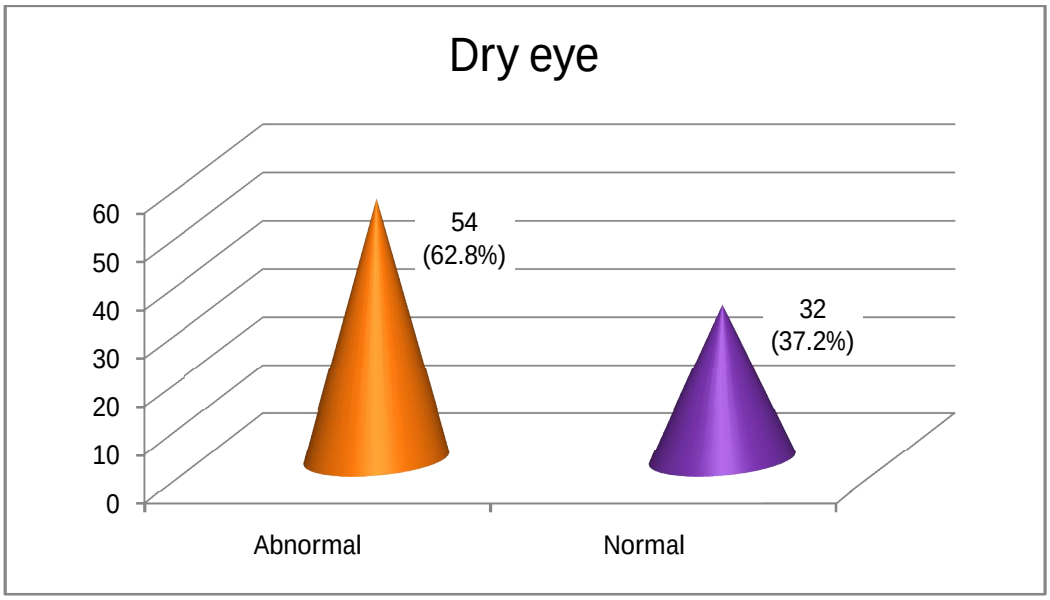
Dry eye was seen in 40 (46.11%) of patients, keratitis + dry eye was seen in 8(9.3%) of patients, anterior uveitis was seen in 2(2.32%) of patients, keratouveitis was seen in 2(2.32%) of patients, retinal vasculitis + dry eye was seen in 4(4.65%) of patients and dry eye + anterior uveitis was seen in 2(2.32%) of patients


ocular manifestations
absent
Dry eye
Keratitis + dry eye
Anterior uveitis
Keratouveitis
Retinal vasculitis + dry eye
Dry eye + uveitis
33%
47%
9%
2%
2%
5%
2%

4. Dry eye and Systemic lupus erythematosus:

Table 5

Dry eye		
	No.of patients	%
present	54	62.8
Absent	32	37.2
Total	86	

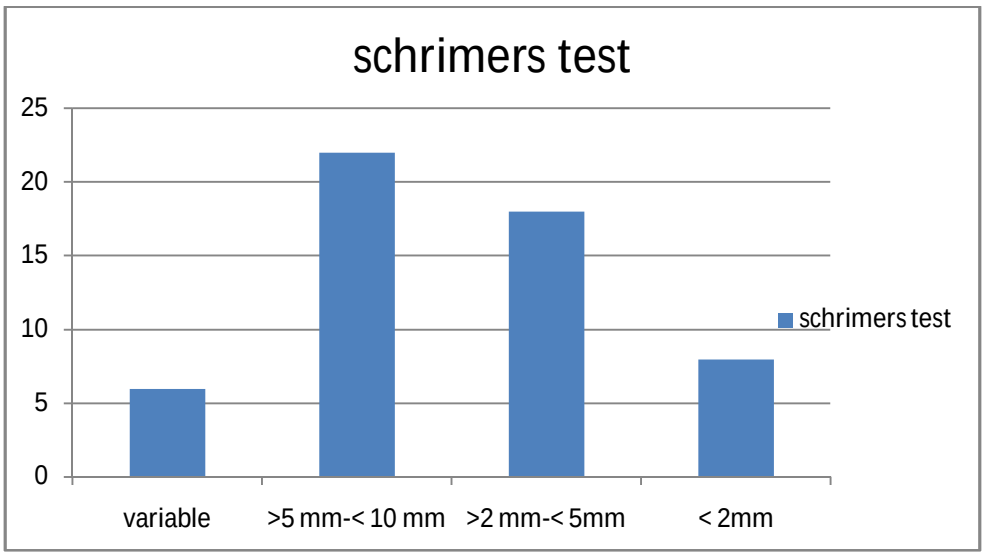


Out of 86 patients 54(62.8%) patients had dry eye and 32(37.2%) patients presented without dry eye

Schrimers test

Table 6

Schrimers test	No. of patients	%
Variable	6	6.97
>5 mm -<10 mm	22	25.58
>2 mm -<5 mm	18	20.93
<2 mm	8	9.30
Total	54	

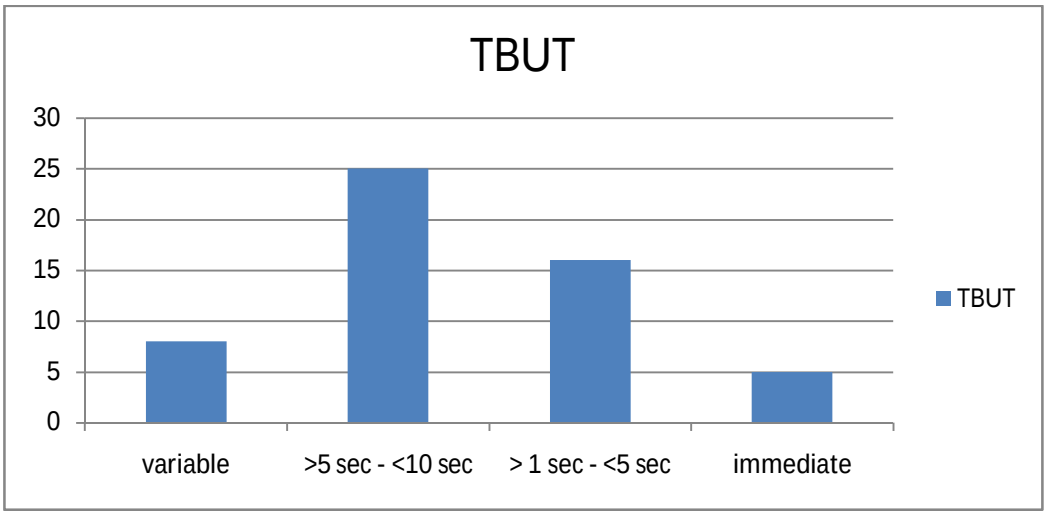


Out of 54 patients with dry eye, schrimers test is variable in 6 patients, > 5mm - <10 mm in 22 patients, >2 mm - <5 mm in 18 patients and <2 mm in 8 patients.

Tear film break up time (TBUT)

Table 7

TBUT	No.of patients	%
Variable	8	9.30
>5 sec - <10 sec	25	29.06
>1 sec - <5 sec	16	18.60
Immediate	5	5.81
Total	54	

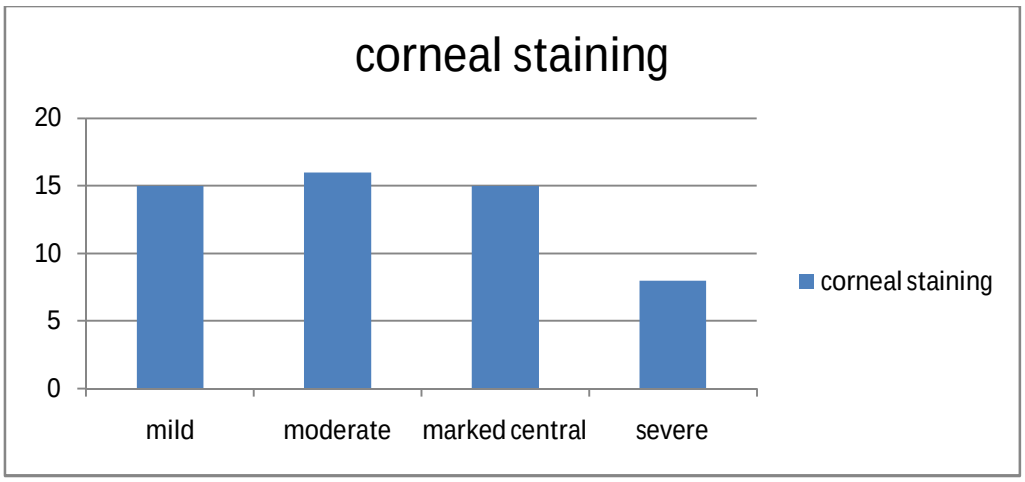


Out of the 54 dry eye patients, TBUT was variable in 8 patients, 25 patients had TBUT >5 sec – <10 sec, 16 patients had TBUT >1 sec - <5sec and immediate breaking up in 5 patients.

Corneal staining:

Table - 8

Corneal staining	No.of patients	%
Mild	15	17.44
Moderate	16	18.60
Marked central	15	17.44
Severe	8	9.30
Total	54	

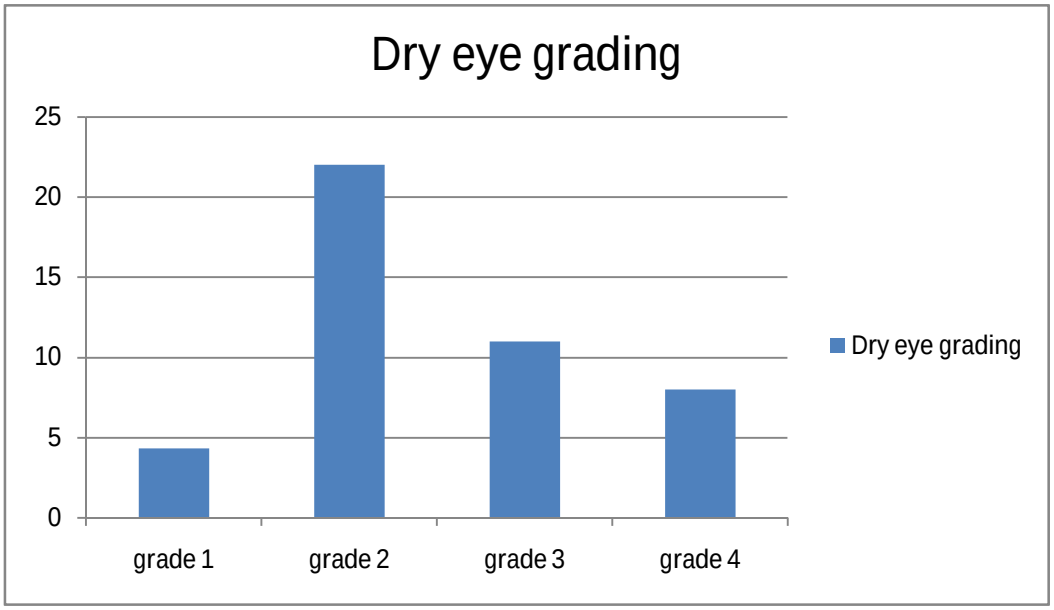


Out of 54 patients with dry eye, corneal staining was mild in 15 patients, moderate in 16 patients marked central in 15 patients and severe (superficial punctate keratitis) in 8 patients

Dry eye grading:

Table 9

Grading	No.of patients
Grade 1	13
Grade 2	22
Grade 3	11
Grade 4	8

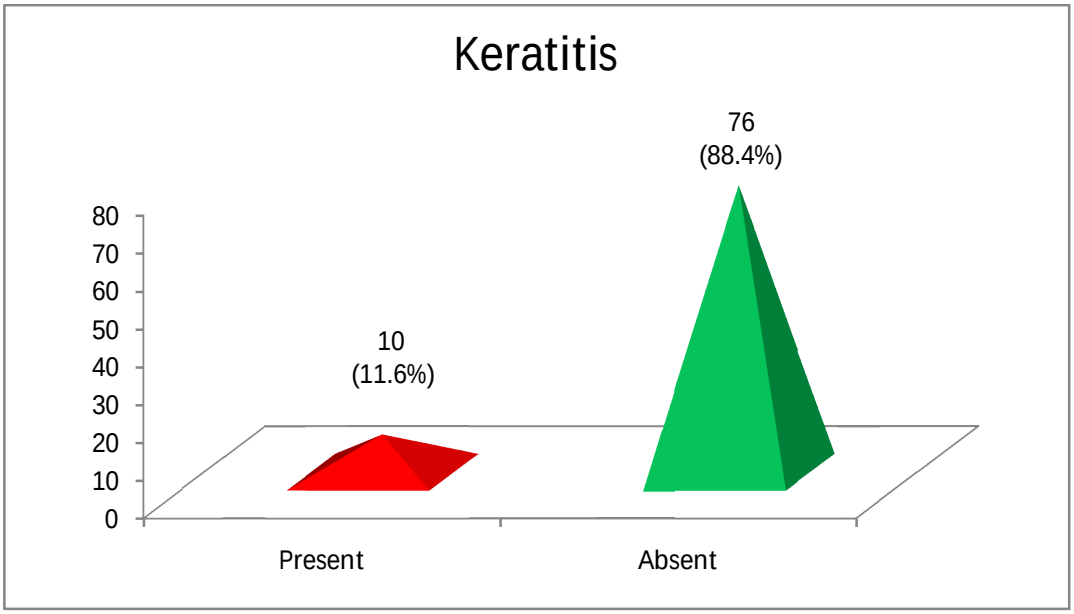


54 Dry eye patients were graded by “DRY EYE SEVERTY GRADING SCHEME – DEWS” and grade 1 dry eye was seen in 13 patients, grade 2 dry eye was seen in 22 patients and grade 3 dry eye was seen in 11 patients and grade 4 dry eye was seen in 8 patients. Thus in our study it was observed that most of the patients had grade 2 dry eye status

6. Keratitis and Systemic lupus erythematosus:

Table 10

Keratitis		
	No.of patients	%
Present	10	11.6
Absent	76	88.4
Total	86	

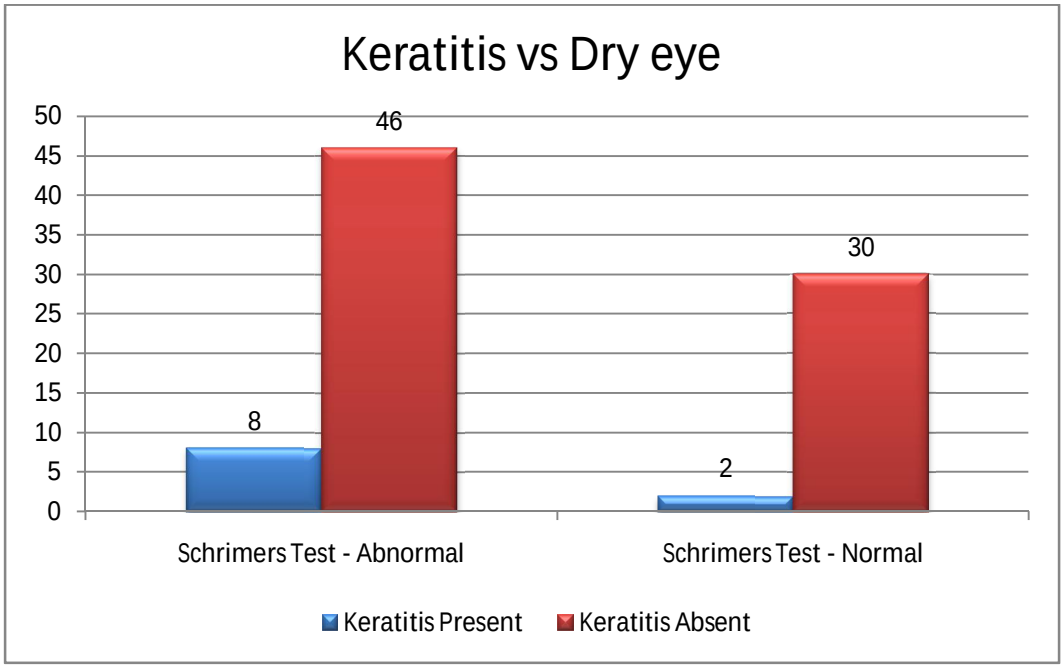


Out of 86 patients 10(12.2%) patients had keratitis . All the 10 patients had superficial punctuate keratitis. No case of interstitial keratitis and peripheral ulcerative keratitis were reported.

7. Comparison of keratitis and dry eye

Table 11

Keratitis vs dry eye	Dry eye-present	%	Dry eye-absent	%	P value Fishers Exact Test
Keratitis Present	8	14.81	2	6.25	0.3098
Keratitis Absent	46	85.19	30	93.75	
Total	54	100.00	32	100.00	

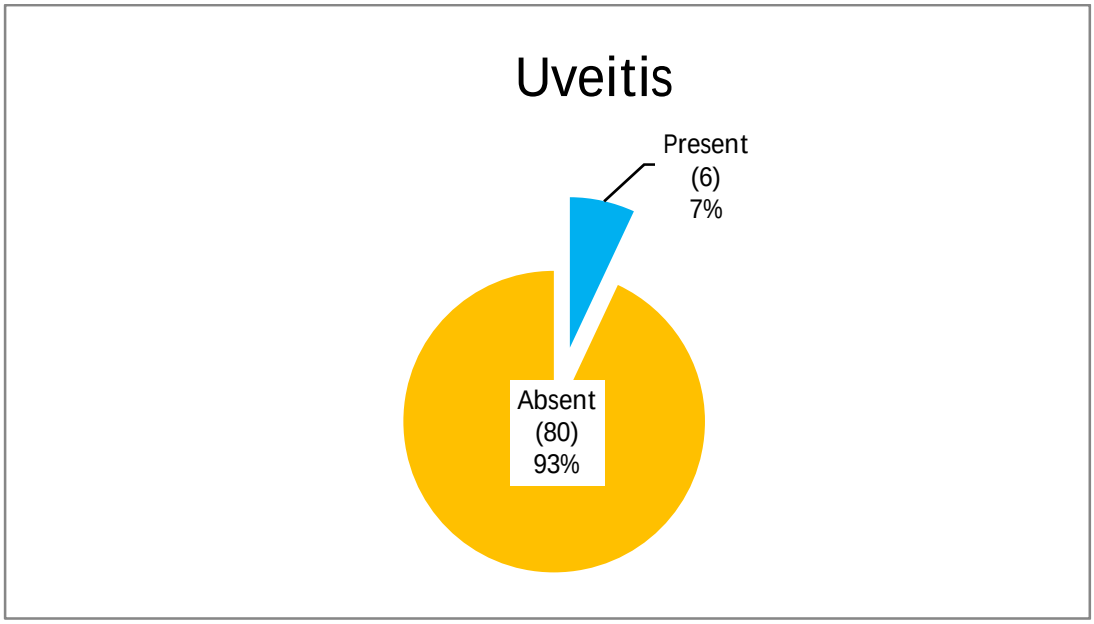


Out of the 10 cases of keratitis, 8 patients had dry eye. Two cases of keratitis were reported in patients without dry eye

8. Uveitis and Systemic lupus erythematosus

Table 12

Uveitis		
	No.of patients	**%**
Present	6	7.0
Absent	80	93.0
Total	86	

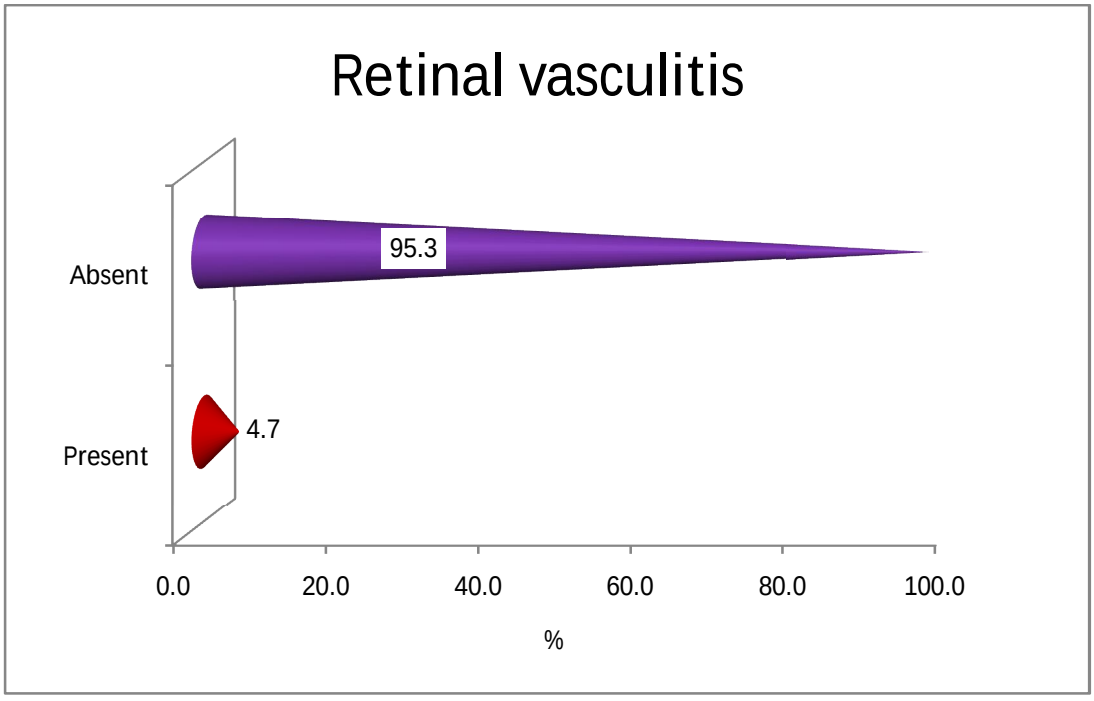


Anterior uveitis was seen 6(7.0%) patients .

9. Retinal vasculitis and Systemic lupus erythematosus

Table 13

Retinal vasculitis		
	No. of patients	%
Present	4	4.7
Absent	82	95.3
Total	86	



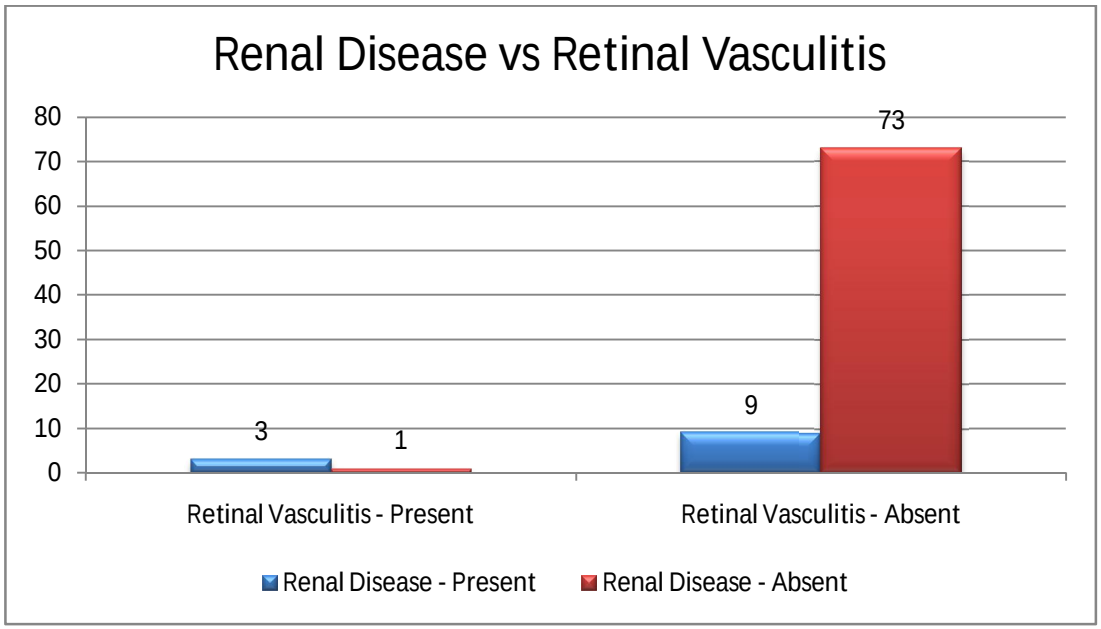
4(4.7%) patients had retinal vasculitis. Vessel sheathing, haemrrhages, cotton wool spot and hard exudates were seen.

10. Comparison of Retinal vasculitis and Renal disease:

Out of 86 patients, 12 patients had renal disease

Table 14

Renal Disease vs Retinal Vasculitis	Retinal Vasculitis - Present	%	Retinal Vasculitis - Absent	%	P value Fishers Exact Test
Renal Disease – Present	3	75.00	9	10.98	0.0067
Renal Disease – Absent	1	25.00	73	89.02	
Total	4	100.00	82	100.00	



Out of 12 renal disease patients , 3 had vasculitis.

Out of 74 patients without renal disease, one had retinal vasculitis.

11. Visual acuity and Systemic lupus erythematosus :

Table 15

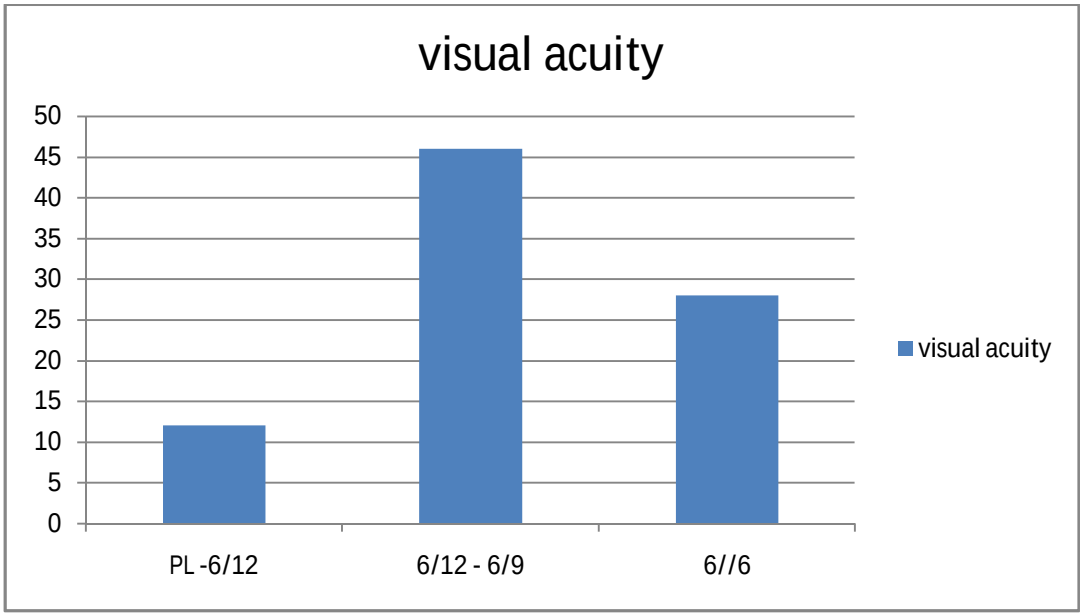
Visual acuity	No. of Patients	Percentage
PL-6/12	12	13.95
6/12-6/9	46	53.48
6/6	28	32.55
Total	86	

12(13.95%) patients had visual acuity of PL- 6/12.

Among which 4 patients had Posterior subcapsular cataract. 2 patients have defective vision due to anterior uveitis, 2 due to refractive error and 4 due to retinal vasculitis.

46 patients have visual acuity 6/12- 6/9 due to refractive error

28 patients have visual acuity of 6/6.



12. Intraocular pressure, orbit and adnexa:

Intraocular pressure was normal in all cases. No orbital and adnexal pathology were found in any of our patients

DISCUSSION

This study was conducted in Government Stanley medical college Hospital During the period of 2016-2017. 86 patients diagnosed by ARA criteria as systemic lupus erythematosus were analysed for ocular manifestations.

Out of the 86 patients analysed 11.6% belonged to the age group of 11- 20 years and 67.4% belonged to the age group of 21-30 years, 18.6% belonged to the age group of 30-40 years. The youngest female reported was 14 years of age and oldest female was above 45 years.

According to Quan Dong Nguyen and C. Stephen Foster in his study, "Systemic lupus erythematosus and Eye" has stated, "90% of systemic lupus erythematosus patients are woman with usual age of disease onset was between the ages 15-45 years". In our most of the patients (93.94%) belong to the age group of 15-45 years.

In our study, sex distribution was 93% female and 7% males. This result was similar to the study by YAPEY, Au Eong KG SUPERHERO KY, Howe HS, Boev ML, Cheah WM, Feng pH were they have incidence of 94% Females and 4% Males.

In our study, ocular manifestations were found in 67.4% patients According to the study by Peggy Frith and coworkers it states that, “overall nearly half the patients had signs which could have been related to the underlying systemic lupus erythematosus.”

In our study 54(62.8%) patients had dry eye. Out of 54 patients , schrimers test was variable in 6 patients, > 5mm - <10 mm in 22 patients, >2 mm - <5 mm in 18 patients and <2mm in 8 patients

TBUT was found to be variable in 8 patients, 25 patients had TBUT >5 sec – <10 sec, 16 patients had TBUT >1 sec - <5sec and immediate breaking up in 5 patients.

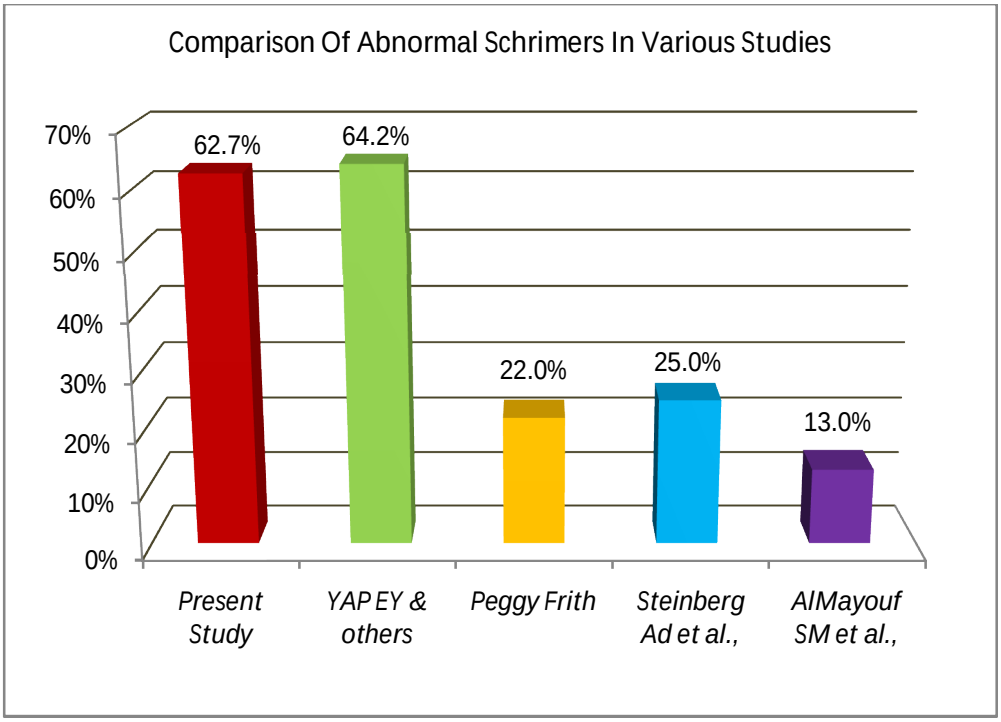
corneal staining was observed to be mild in 15 patients, moderate in 16 patients, marked central in 15 patients and severe (superficial punctate keratitis) in 8 patients. Dry eye patients were graded by “DRY EYE SEVERTY GRADING SCHEME – DEWS” and Grade 1 dry eye was seen in 13 patients, Grade 2 dry eye in 22 patients and Grade 3 dry eye in 11 patients and Grade 4 dry eye in 8 patients.

Thus in our study it was observed that most of the patients had Grade 2 dry eye status. In the study by Tan Tock Sen hospital by YAPEY, Au Eong KG Fong KY, Howe HS, Boev ML, Cheah WM, Feng

PH, 64.2% that is(45 patients out of 70 patients) had dry eye , which correlates with our study. In the study by Al Mayouf SM , AL Hemidan AI, 13% has dry eye.

In a study by Peggy Firth, “External ocular finding in lupus erythematosus” the incidence of dry eye was 22%. Lastly the study by Steinberg AD et al, has quoted that “the most common ocular manifestation of systemic lupus erythematosus is keratoconjunctivitis sicca, approximately in 25% of patients”. Thus the incidence of and dry eye status varied in different studies. Probably the inclusion criteria for dry eye status and test reliability will account for the varied presentation.

Comparison Of Abnormal Schrimers In Various Studies		
Sl. No	Studies	%
1	Present Study	62.7%
2	YAP EY & others	64.2%
3	Peggy Frith	22.0%
4	Steinberg Ad et al.,	25.0%
5	AlMayouf SM et al.,	13.0%



In our study, 11.6% patients had keratitis.

Out of the 10 (11.6%) cases of keratitis, 8 patients had dry eye. Two cases of keratitis were reported in patients without dry eye.

6.6% of keratitis were reported by Gold and his collegues. In the study conducted by Speath 88% of systemic lupus erythematosus patients had superficial punctate kertatitis.

In our study Anterior Uveitis was seen in 7% patients, which resolved with steroids.

Reviewing the literature, by Al Mayouf SM, AL Hemidan " ocular manifestation of systemic lupus erythematosus in children "only one case of bilateral iridocyclitis was reported by them.

In the study by Drosos AA, Petris CA, Petroutsos GM, Moutsopoulos HM, "Unusual eye manifestations in systemic lupus erythematosus patients", states that anterior uveitis is not an uncommon manifestation of systemic lupus erythematosus.

IOP was normal in all cases in our study.

3 eyes of 2 patients presented raised intraocular tension in the study conductd by YAPEY and his collegues. In our study 4.7% patients had retinal vasculitis.

In the study by Charles 7% -26% had lupus retinopathy (i.e) retinal vasculitis associated with local microinfarction.

The retinopathy in patients with systemic lupus erythematosus was found to be associated with renal dysfunction.

In our study 13.5% had visual acuity <6/12. . 4 patients had Posterior subcapsular cataract. 2 patients have defective vision due to uveitis, 2 due to refractive error and 4 due to retinal vasculitis.

In the study conducted by Yap Vaghti and his collegues 12.3% patients had visual acuity <6/12.

4 patients having optic neuropathy ,4 patients having posterior subcapsular cataract , retinal vasculitis in 3 patients and Pthsis bulbi in one eye.

Posterior subcapsular cataract was attributed as a part of treatment sequalae for the patients on steroids. Yet Vision-threatening complications can occur in systemic lupus erythematosus and is will

prøve grave if not intervened at appropriate time and can lead to serious visual loss.

In our study ,none of the patients had any orbit, eyelid lesion, extraocular modality disorder, optic neuropathy or a retrochiasmal disorder of Vision.

Comparison of Asian study & present study

Parameters	ASIAN STUDY		PRESENT STUDY	
	Patients	Percentage	Patients	Percentage
Total no of patients	70	-	86	-
Males	4	6	6	6.9
Females	66	94	80	93.0
Mean age	32.9	-		
Ocular manifestations	-	-	58	67.4
Dry eye	45	64.2	54	62.7
Retinal vasculitis	9	12.85	4	4.6
BCVA<6//12	7	10	12	13.95
Tension	2	2.8	-	-
Uveitis	-	-	6	6.9
Keratitis	-	-	10	11.6

SUMMARY

This clinical study was done at Department of ophthalmology Govt. Stanley medical college, Chennai.

A total of 86 patients were examined and out of which 80 (93.0%) were females and 6 (6.9%) were males.

The mean age of manifestation of systemic lupus erythematosus were found to be range from 11 to 45 yrs – [27.20 yrs]

Ocular manifestations were found in 67.44 % of patients in systemic lupus erythematosus.

54 (62.79%) patients had features of dry eye.

10 patients (11.62%) had superficial punctate keratitis

2 Patients also exhibit superficail punctate keratitis unrelated to dry eye status.

6 patient (6.09%) had anterior uveitis.

12(13.95%) patients had visual acuity of less than 6/12. 4 patients had Posterior subcapsular cataract. 2 patients have defective vision due to uveitis, 2 due to refractive error and 4 due to retinal vasculitis

Intraocular pressure was normal in all cases.

No eyelid lesion, orbital lesions were found

Four patients (4.65%) had retinal vasculitis.

Retinal vasculitis is observed more in patients with renal disease.

CONCLUSION

Eye is a highly sensitive tool for the onset and reactivation of autoimmune phenomenon.

In this study the prevalence of ocular manifestation in systemic lupus erythematosus was found to be 63.63% with female preponderance (67.4%).

Among the ocular manifestation presented in SLE patients, keratoconjunctivitis sicca is the most common manifestation followed by keratitis, uveitis, retinal vasculitis and posterior subcapsular cataract.

Uveitis and vasculitis were found to be the vision threating complication with bilateral presentation.

So, ophthalmic screening of all SLE patients is necessary, especially if they are suffering from renal or CNS lupus.

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PROFORMA

I. PATIENTS RECORD

Name Age Sex: Male /Female

Address I.P/O.P – No

II. Complaint:

Laterality Right eye Left eye Both eye

Symptoms: Defective vision

Foreign body sensation/ Irritation

Pain

Floaters

Duration

Onset

Severity

Course

Previous attack

SYSTEMIC HISTORY

General Fever/malaise / Loss of Weight/Loss of Appetite

Skin Rashes / nodules / utricaria / edema / raynaud

phenomenon/ alopecia / ulcers

Joints Arthritis / Arthralgia

Neurological headache / seizures / psychoses

Renal edema of legs / puffiness of face / polyuria / oliguria

H/O INTAKE OF DURGS

Treatment history Time of initiation/ duration/ compliance

On steroid

Not on steroid

Anti metabolites

OCULAR EXAMINATION

1. Eye brows	Madrosis	
2. Eye lids	Madrosis	
	Ptosis	
3. Tear film	Tear film height/Tear break up time/	
	Schrimer test I and II	
4. Conjunctiva	Congestion / nodule	
5. Cornea	keratitis (superficial punctate keratitis /ulcer/	
	interstitial keratitis/ peripheral ulcerative keratitis)	
6. Corneal sensation	present / absent/ diminished	
7. Anterior chamber	shallow/ Normal depth / flare / cells	
8. Iris	Iritis	
	Iridocyclitis	
	Synechiae formation	
	Membrane formation	
9. Pupil	size / shape / reaction to light	
	Reaction	Direct
		Indirect
		Relative afferent pupillary defect
10. Lens		Clear
		Immature cataract
		Posterior sub capsular cataract

	Mature cataract
	Pseudophakia
	Aphakia
	Intra Ocular Lens
11. Best corrected Visual Acuity	Right Eye
	Left Eye
12. Intra Ocular Pressure	
13. Fields	
14. Colour Vision	
15. Refraction	Objective method
	Subjective method
16. Fundus	
	Direct ophthalmoscope
	Indirect ophthalmoscope
17. Orbit and adnexa	

Diagnosis

Lab investigations

1. Total Count

   Differential Count
   Erythrocyte Sedimentation Rate

2. peripheral smear

3. Urine Albumin

   Sugar

   Deposits

proteins

4. Haemoglobulin

   Red Blood Cell Count

   Platelets Count

   Bleeding Time / Clotting Time

5. Blood urea and Serum creatinine

6. Anti double stranded DNA

Treatment

																							FUNDUS				
Serial No	**Name**	**Age**	**Sex**	**Ocular Manifestation**	**Ocular symptoms**	**Renal disease**	**Eye**	**Eyebrows/Lids**	**Conjunctiva**	**Tearfilm level**	**Tear film break up time**	**Schrimers's Strip**	**Sclera**	**Cornea(SPK)**	**Anterior Chamber**	**Iris**	**Pupil**	**Lens**	**Visual Acuity**	**Tension**	**Fields/colour vision**	**Refractive Error**	**Orbit/Adnexa**	**Vitreous**	**Disc**	**Vessels**	**Macula**	**Background Retina**
1	Nagammal	32	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
2	Valli	28	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
3	Kanaga	30	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
4	Chandra	23	F	P	A	P	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
5	Manga	30	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
6	Kanchana	24	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
7	Shanthi	29	F	P	P	A	OD	N	Abn	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
8	Rakamma	54	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
9	Mary	22	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N

10	Thangavelu	30	M	P	P	A	OD	N	Abn	N	N	N	N	Abn	Abn	Abn	N	PSC	6/36	N	N	P	N	N	N	N	N	N
							OS	N	Abn	N	N	N	N	Abn	Abn	Abn	N	PSC	6/24	N	N	P	N	N	N	N	N	N
11	Deepa	19	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
12	Murugan	28	M	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
13	Pangajam	34	F	P	A	A	OD	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
14	Leelavathy	22	F	P	P	P	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	Abn	N	Abn
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	Abn	N	Abn
15	Ranganayagi	26	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
16	Revathy	20	F	P	A	A	OD	N	Abn	Abn	Abn	Abn	N	Abn	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	Abn	Abn	Abn	Abn	N	Abn	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
17	Poornima	25	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
18	Kanagavalli	36	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
19	Venilla	20	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
20	Banu	24	F	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
21	Rukumani	33	F	P	A	A	OD	N	Abn	Abn	Abn	Abn	N	N	Abn	Abn	N	N	6/24	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	Abn	Abn	N	N	Abn	Abn	N	N	6/18	N	N	A	N	N	N	N	N	N
22	Laxmi	27	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N

23	Amsa	38	F	A	A	P	OD	N	N	N	N	N	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
24	Anbuselvi	23	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
25	Karthiga	28	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/18	N	N	P	N	N	N	N	N	N
26	Rajeshwari	26	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
27	Saradha	23	F	P	A	A	OD	N	Abn	N	N	N	N	N	Abn	Abn	N	N	6/12	N	N	A	N	N	N	N	N	N
							OS	N	Abn	N	N	N	N	N	Abn	Abn	N	N	6/12	N	N	A	N	N	N	N	N	N
28	Kanchana	22	F	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
29	Sivagami	25	F	P	A	P	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
30	Muthammal	31	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	Abn	N	N	N	PSC	6/18	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	Abn	N	N	N	PSC	6/12	N	N	P	N	N	N	N	N	N
31	Pramila	27	F	P	P	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
32	Manjula	25	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
33	sumathy	29	F	P	A	P	OD	Abn	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
							OS	Abn	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
34	Divya	18	F	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
35	Ambika	27	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/18	N	N	P	N	N	N	Abn	N	Abn
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	Abn	N	Abn

36	Kanimozhi	22	F	A	A	P	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
37	Senthil	36	M	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N
38	Janani	22	F	P	A	A	OD	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/9	N	N	A	N	N	N	N	N
							OS	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/12	N	N	A	N	N	N	N	N
39	jeeva	28	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
40	Prema	25	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
41	Saranya	27	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
42	chitra	14	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
43	Latha	32	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
44	manonmani	32	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
45	kayalvizhi	28	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N
46	ajitha	30	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
47	vanathi	23	F	P	A	P	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N
48	nazreen	30	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N

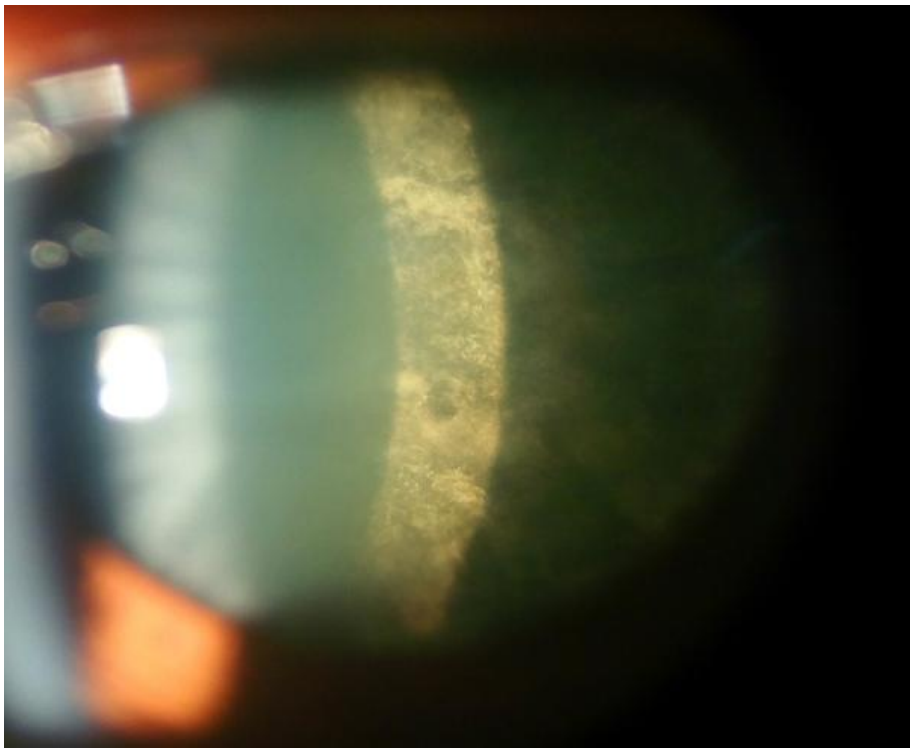
49	sulthana	24	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6//6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
50	kanmani	29	F	P	P	A	OD	N	Abn	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
51	thenmozhi	54	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
52	malathy	22	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
53	vinoth	30	M	P	P	A	OD	N	Abn	N	N	N	N	Abn	Abn	Abn	N	PSC	6/36	N	N	P	N	N	N	N	N	N
							OS	N	Abn	N	N	N	N	Abn	Abn	Abn	N	PSC	6/24	N	N	P	N	N	N	N	N	N
54	dhamayanthi	19	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
55	jothi	28	M	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
56	kasthuri	34	F	P	A	A	OD	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
57	maliga	22	F	P	P	P	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	Abn	N	abn
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	Abn	N	abn
58	chandrika	26	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
59	aarthy	20	F	P	A	A	OD	N	Abn	Abn	Abn	Abn	N	Abn	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	Abn	Abn	Abn	Abn	N	Abn	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
60	madhumitha	25	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
61	mahalakshmi	36	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N

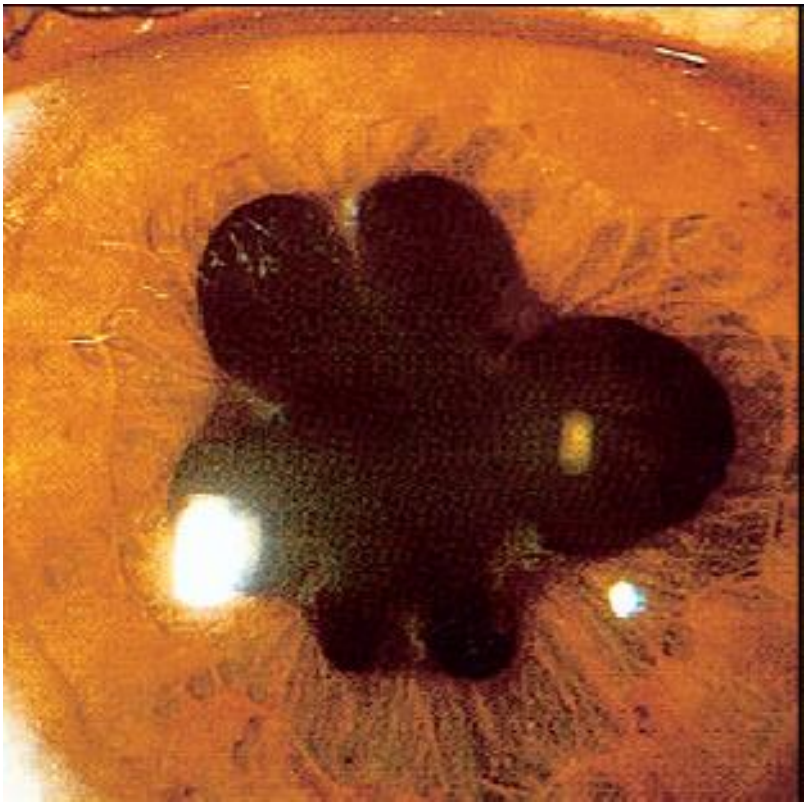
62	lavanya	20	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
63	suganya	24	F	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
64	sangamithra	33	F	P	A	A	OD	N	Abn	Abn	Abn	Abn	N	N	Abn	Abn	N	N	6/24	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	Abn	Abn	N	N	Abn	Abn	N	N	6/18	N	N	A	N	N	N	N	N	N
65	savithri	27	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
66	kantha	38	F	A	A	P	OD	N	N	N	N	N	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
67	muthulakshmi	23	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
68	sunitha	28	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/24	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/18	N	N	P	N	N	N	N	N	N
69	gowri	26	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
70	rani	23	F	P	A	A	OD	N	Abn	N	N	N	N	N	Abn	Abn	N	N	6/12	N	N	A	N	N	N	N	N	N
							OS	N	Abn	N	N	N	N	N	Abn	Abn	N	N	6/12	N	N	A	N	N	N	N	N	N
71	patroja	22	F	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
72	dhanalakshmi	25	F	P	A	P	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/18	N	N	P	N	N	N	Abn	N	abn
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	Abn	N	abn
73	sundari	31	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	Abn	N	N	N	PSC	6/18	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	Abn	N	N	N	PSC	6/12	N	N	P	N	N	N	N	N	N
74	selvarani	27	F	P	P	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N

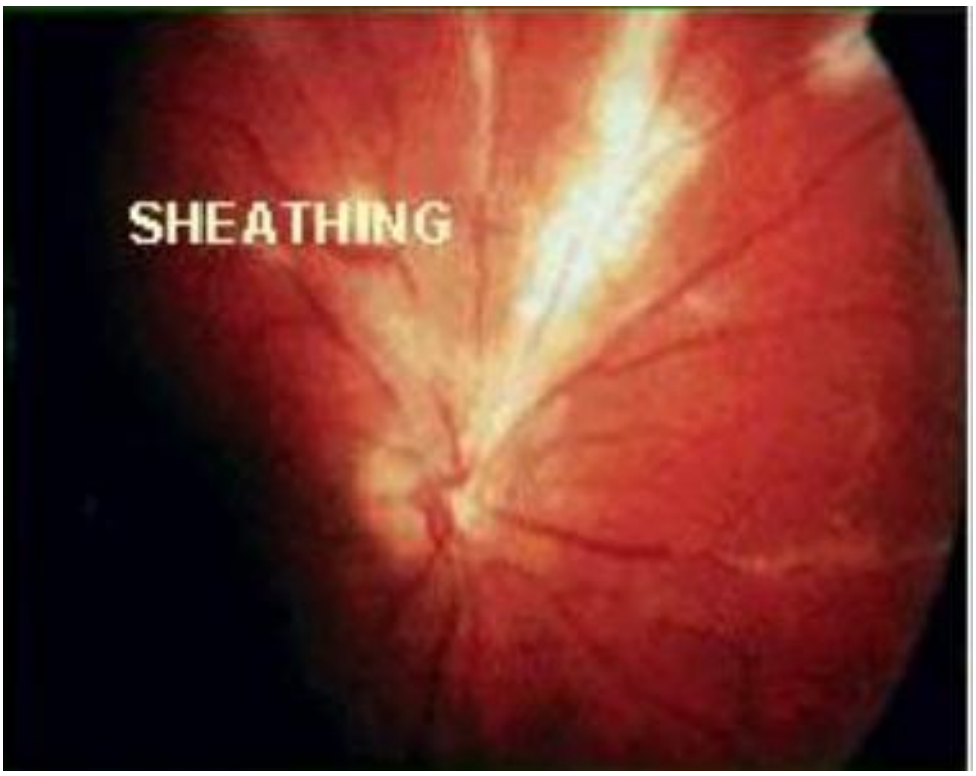
75	balamani	25	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
76	majebee	29	F	P	A	P	OD	Abn	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
							OS	Abn	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
77	chinnaponnu	18	F	P	A	A	OD	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	N	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
78	kanammal	27	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/12	N	N	P	N	N	N	N	N	N
79	parvathi	22	F	A	A	P	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
80	saravanan	36	M	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
81	pandiamma	22	F	P	A	A	OD	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/9	N	N	A	N	N	N	N	N	N
							OS	N	Abn	Abn	N	Abn	N	Abn	N	N	N	N	6/12	N	N	A	N	N	N	N	N	N
82	saroja	28	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
83	sharmila	25	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
84	padmavathy	27	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
85	kumari	14	F	P	A	A	OD	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
							OS	N	N	Abn	Abn	Abn	N	N	N	N	N	N	6/9	N	N	P	N	N	N	N	N	N
86	sankareshwari	32	F	A	A	A	OD	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N
							OS	N	N	N	N	N	N	N	N	N	N	N	6/6	N	N	A	N	N	N	N	N	N


ASSISTANT PROFESSOR ROOM


CUBICLE 4






SHEATHING